Minnesota

STRATEGIC HIGHWAY SAFETY PLAN

2014-2019

Foreword

You see things; and you say "Why?"
But I dream of things that never were;
and I say "Why not?"
—George Bernard Shaw

While challenging us to be creative and progressive, playwright George Bernard Shaw reminds us that visualizing solutions requires understanding of where we are and where we are going. Just like the stage, safety is all about context. The cover of the report shows an aesthetically pleasing roadway, complete with vivid pavement markings, bright signs, and smooth pavement—likely built to the most recent standards. Is this an image of a safe road for all road users and under varied circumstances? Consider changing a tire, riding your bike, or walking on this roadway—does the road provide space and a sense of security? Suppose the other drivers on this road were distracted, fatigued, or left the road—does the surrounding environment facilitate recovery or minimize your chance of injury? How would the safety of this road change if you were driving a large truck, rendering emergency service, or performing routine maintenance on this road? Roads are complex environments; appreciating the interactions between the actors and context will set the stage for road safety.

Since 2009, nearly 2,000 people died on Minnesota roads. Why not zero? In 2003, Minnesota adopted a Toward Zero Deaths approach to transportation safety. This approach brings together: education, enforcement, engineering, emergency response and trauma systems, and many others. The overarching goal for Minnesota is zero roadway fatalities. The Minnesota Strategic Highway Safety Plan is the guiding document for traffic safety partners to recognize traffic safety issues and coordinate traffic safety solutions. Minnesota's 2020 goal of fewer than 300 roadway fatalities, the implementation of proven, effective safety strategies are fundamental.

As safety advocates our challenge is to stay committed to the traffic safety strategies we know work, but also recognize opportunities for innovation and improvement. The Minnesota Strategic Highway Safety Plan acknowledges the contribution of Minnesotan's traffic safety values, norms, attitudes, and beliefs to our goal of zero roadway fatalities. A positive traffic safety culture rejects roadway fatalities and life-changing injuries as a cost of doing business and values the life and well-being for all roadway users. Developing a positive traffic safety culture is a long-term commitment that is not without challenges and demand for hard work.

Minnesota Department of Transportation

Transportation Building
395 John Ireland Boulevard
Saint Paul, Minnesota 55155-1899

December 2014

Dear Citizens of Minnesota,

We are pleased to share with you the *Minnesota Strategic Highway Safety Plan 2014-2019*, which provides insight and direction on how to reduce traffic-related crashes.

The SHSP is a comprehensive policy plan based on data and trends that will affect traffic safety during the next several years. We developed it with input from safety stakeholders from education, emergency medical and trauma services, enforcement, engineering and other disciplines. The plan presents a view of the statewide crash record, along with focus area priorities and strategies to keep moving toward a goal of zero deaths on Minnesota roads. The plan also highlights opportunities for collaboration, and provides targets and performance measures to chart progress.

Crashes impact everyone. More than 40 percent of Americans report having been involved in a serious crash, having had a friend or relative seriously injured or killed in a crash, or both. The emotional, physical and financial impact is felt immediately for those directly involved in crashes, but eventually crashes affect the rest of the community through higher insurance rates, infrastructure repairs, economic loss and more.

Fortunately, crashes are often preventable with the right traffic safety strategies. For more than a decade, Minnesota has made a targeted effort to reduce traffic fatalities through its multi-agency Toward Zero Deaths initiative. In 2011, there were 368 people killed in traffic crashes on Minnesota roads – the fourth consecutive annual decrease in traffic fatalities and the first time since 1944 that fewer than 400 people died on Minnesota roads. The trend is encouraging, but there is so much more we all can do.

Everyone can use the SHSP: legislators, to pass laws that support safety efforts; policy makers, to develop traffic safety investment plans; traffic engineers, to make road safety improvements; law enforcement, to target problem areas; trauma care professionals, to improve the health outcomes and survivability of those involved in crashes; safety advocates, to tailor outreach efforts; and communities to keep their young and old alike aware of traffic safety.

Everyone has a stake in preventing crashes. Together, we can create a culture in which traffic fatalities and serious injuries are no longer acceptable.

Sincerely,

Charles A. Zelle, Commissioner
Minnesota Department of Transportation

Ramona L. Dohman, Commissioner
Minnesota Department of Public Safety

Dr. Edward Ehlinger, Commissioner
Minnesota Department of Health

Minnesota Department of Transportation
395 John Ireland Boulevard Saint Paul, MN 55155

January 20, 2015

Dear Fellow Minnesotans,

In accordance with Moving Ahead for Progress in the 21st Century (MAP 21), each state Department of Transportation is required, under federal law, to update their Strategic Highway Safety Plan. The plan presented here fulfills this requirement. Minnesota's Strategic Highway Safety Plan is the result of rigorous statistical analyses and input from hundreds of stakeholders across disciplines, levels of government, and types of organizations.

The Minnesota Strategic Highway Safety Plan is data informed, strategic, and focuses on crashes that cause fatal and life-altering, serious injury. This plan guides traffic safety partners to the most prevalent high-risk crash types and driver choices associated with these types of crashes. The SHSP also recognizes the risks of injury and death of vulnerable roadway users. This guide also offers a selection of strategies to address Minnesota's most pressing traffic safety challenges.

The path toward zero fatalities is paved with targeted milestones. Over the last ten years, Minnesota has met most of our fatality and serious injury targets. The Minnesota Strategic Highway Safety Plan features Minnesota's next target. By 2020, fewer than 300 people will die on Minnesota roads and fewer than 850 people will sustain life altering injuries.

As a department and as a co-leader of Minnesota Toward Zero Deaths, we value the life and wellbeing of all roadway users. Roadway fatalities are not an acceptable part of transportation; therefore, Minnesota's roadway ultimate vision is zero fatalities. The 2014 Minnesota Strategic Highway Safety plan is a guide for all traffic safety partners across all levels of government and community, and across disciplines.

On behalf of the Commissioner of the Minnesota Department of Transportation, I am pleased to present the 2014 Minnesota Strategic Highway Safety Plan.

Sincerely,

Susan Mulvihill, P.E.
Deputy Commissioner/Chief Engineer

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Figures, Table & Exhibits

Executive summary

This Minnesota Strategic Highway Safety Plan provides insight and direction on how to reduce traffic-related crashes that involve motor vehicles on all Minnesota roads. It describes how many, where, what type and to whom motor vehicle crashes occur. The SHSP is a policy plan based on data and trends that will affect traffic safety during the next several years. It was developed in consultation with safety stakeholders from education, emergency medical and trauma services, enforcement, engineering and other disciplines. The plan presents a view of the statewide crash record, along with focus area priorities and strategies to keep moving toward a goal of zero deaths on Minnesota roads. The plan also highlights opportunities for collaboration, and provides targets and performance measures to chart progress.

Crashes

Minnesota has made significant progress in reducing the effect of crashes. Nationally, Minnesota had the second lowest traffic fatality rate per 100 million vehicle miles traveled in 2011. That same year, 368 people died in traffic crashes – the first time since 1944 that fewer than 400 people died on Minnesota roads. This also meant that Minnesota had reached the intermediate target of fewer than 400 deaths that was established in the 2007 SHSP.

More fatal and serious injury crashes occur on roads outside of the Twin Cities metropolitan area. The fatal and serious injury crashes that occurred from 2008-2012 most commonly involved lane departure, intersections, unbelted vehicle occupants or impairment. However, these crash factors and their corresponding focus areas are often deeply intertwined. Crash data were more deeply analyzed to identify where correlations among the focus areas exist. Intersections were found to have the strongest such connections to inattentive drivers, commercial vehicles, younger and older drivers, bicyclists and pedestrians. This means that when a crash happens at an intersection, it can often be correlated to one of these other focus areas, which in turn means that efforts to decrease intersection crashes will most likely lead to fewer crashes within the connected focus areas.

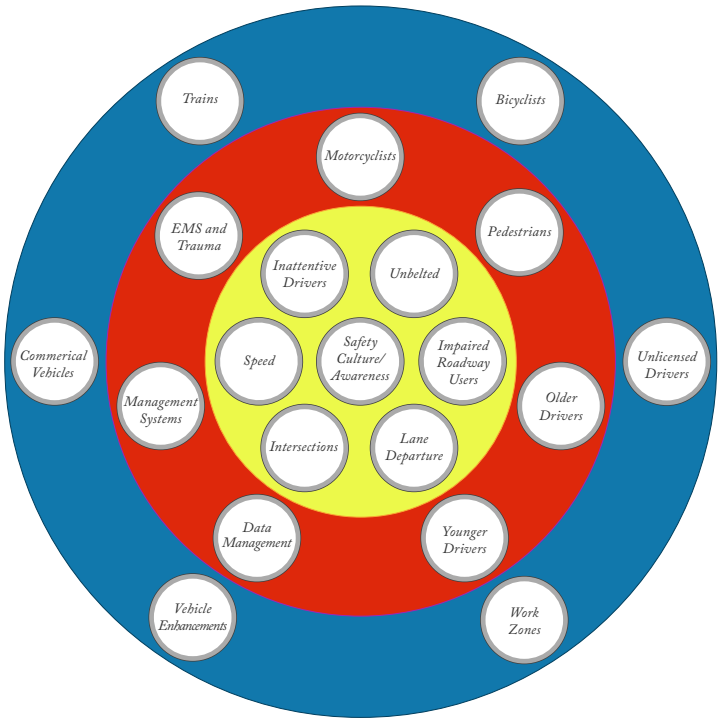


Figure 5: Focus Area Priorities

Focus areas

The results of crash data analyses were blended with information about trends that will affect transportation in the future, as well as with input from stakeholders facing safety issues in the present. This approach provided well-rounded information that was used to establish Minnesota's focus area priorities. The focus areas themselves represent factors that contribute to crashes and they provide context for setting future traffic safety priorities. Focus areas are often correlated with one another as crashes in one focus area can have a similar positive or negative effect in another. For this reason, future priorities are inclusive of all the focus areas to reflect the nature of these relationships. The primary focus areas identified for Minnesota during the next several years are:

- Traffic safety culture and awareness
- Intersections
- Lane departure
- Unbelted occupants
- Impaired roadway users
- Inattentive drivers
- Speed

Although notable reductions have been made in each of these focus areas during recent years, a majority of the fatal and serious injury crashes on Minnesota roads still fall into these higher priority focus areas. Many of the crashes in these focus areas are also based on driver choices and behavior. Preventing such crashes to reach Minnesota's goal of zero fatalities will require everyone to see traffic safety as a priority for themselves and for their family and friends. Currently, public attitudes around traffic safety do not yet reflect a culture that finds traffic fatalities as unacceptable. For these reasons, traffic safety culture and awareness is the most fundamental focus area for Minnesota's safety community to address in coming years.

Strategies

As a policy plan, the SHSP sets an overall direction for future safety strategies that emphasizes investment in top performing strategies to maximize the reduction of fatal and serious injury crashes. Minnesota has a strong record of implementing safety strategies that have significantly reduced crashes. The state also has a history of exploring innovation to improve safety and will remain attentive to such opportunities in the future. The SHSP also presents a recommended framework for selecting safety strategies that will be included in safety-related investment plans. The framework mirrors steps taken while developing this plan, highlighting the importance of involving stakeholders in the process. Traffic safety is such a pervasive topic that many plans identify strategies associated with it. In recognition of the need to coordinate strategies and maximize outcomes, the SHSP brings together a variety of efforts pursued in relation to traffic safety. More than 500 safety strategies were identified during the development of the plan. Some are proven, while others have been tried with some success. Still others are considered experimental or are simply the ideas of passionate stakeholders stretching the limits of current thinking. The list of strategies compiled in the plan is intended to be an initial reference point for stakeholders wishing to champion safety improvements.

Collaboration

The success of many safety strategies implemented during the past decade can be attributed to the formation of the Toward Zero Deaths program. TZD is a program of diverse partners who collaborate to improve traffic safety across all focus areas. In 2013, TZD celebrated celebrated a decade of striking progress, including a decrease of more than 40 percent in traffic fatalities. Such a dramatic decrease in fatalities is an extraordinary accomplishment but work must continue. Minnesota's 2007 SHSP identified the need to emphasize safety efforts on local roads and streets, where most traffic fatalities in Minnesota occur. Recognizing that further reductions in fatal and serious injury crashes would require greater collaboration, a statewide initiative to develop local road safety plans began in 2009. All Minnesota counties now have local road safety plans that provide a risk assessment and list of recommended, low-cost strategies for specific at-risk roads. Taking collaboration to the next level, several investment and additional policy plans were reviewed during the development of this SHSP. They were reviewed for references to safety strategies, performance measures and partnering opportunities. A brief description of each plan is provided in this document to support cross-referencing among the plans, continued coordination as plans are updated, and collaboration in selecting safety strategies. Hard work, determination and collaboration will make it possible for Minnesota to reach its ultimate goal of zero deaths.

Performance

Establishing targets and charting progress toward them is vital to helping everyone understand how close Minnesota is to achieving its goal of zero deaths. The SHSP establishes performance measures and tracking indicators that will be used to monitor progress toward the targets of fewer than 300 fatalities and fewer than 850 serious injuries by 2020. The collective progress illustrated by these performance measures and tracking indicators will be used by traffic safety partners to refine strategies and dynamically plan overall direction for Minnesota's traffic safety efforts.

The framework and direction established by the SHSP will be used by traffic engineers to construct road safety improvements. Police will target problem areas based on data in the plan. Traffic safety programs will develop investment plans in conjunction with the SHSP. Advocates will use the plan to tailor their outreach efforts. The plan is intended to guide the safety efforts of all Minnesotans during the next five years. Everyone has a stake in preventing crashes. In addition to the individuals directly involved, crashes eventually affect everyone through higher insurance rates, infrastructure repairs, economic loss and much more. Communities will look to the SHSP for keeping their young and old alike aware of traffic safety.

Crashes impact everyone

Although crashes can happen to anyone, anywhere and at any time, they are not accidents. Crashes are often preventable with the right traffic safety strategies. Many such strategies have been successfully implemented to prevent crashes and are part of the trips that Minnesotans take each day. Roads are constructed and maintained to certain safety standards. Signs are posted in places to guide or warn travelers of hazards. Drivers are trained to obey the laws of the road. Public service announcements remind everyone to buckle up, slow down, drive sober and stay focused. Officers patrol the roadways to correct or remove those who disobey the law. Designated routes keep pedestrians and bicyclists safe from other roadway users. Motorcyclists wear helmets and protective clothing. Truckers limit how long they drive before resting. Car manufacturers are making cars smarter through lane-keeping and braking assistance technology. With so many safety features designed to prevent crashes, it is both difficult to understand why they continue to happen and challenging to find new safety approaches.

A Strategic Highway Safety Plan is a statewide, coordinated plan that provides a comprehensive framework for reducing fatalities and serious injuries on public roads. It identifies key safety needs and guides investment decisions towards strategies and countermeasures with the most potential to save lives and prevent injuries. The federal Moving Ahead for Progress in the 21st Century Act upholds the requirement for states to maintain a SHSP. The SHSP allows traffic safety partners to work together to align goals, leverage resources and collectively address safety challenges. (Federal Highway Administration, 2014)

This Minnesota Strategic Highway Safety Plan provides insight and direction on how to reduce traffic-related crashes that involve motor vehicles. It describes how many, where, what type and to whom motor vehicle crashes occur. The SHSP is a policy plan based on data and trends that will affect traffic safety during the next several years. It was developed in consultation with safety stakeholders from education, emergency medical and trauma services, enforcement, engineering and other disciplines. The plan presents Minnesota's crash history along with future focus area priorities and a framework for selecting traffic safety strategies that will continue moving the state toward zero deaths. It also highlights opportunities for collaboration and performance measures to chart progress. The SHSP appendices provide even greater detail for safety professionals regarding data analyses, focus areas and potential strategies.

Crashes are not accidents; they are preventable.

Everyone can use the SHSP

The SHSP will be used by traffic engineers to make road safety improvements. Law enforcement will target problem areas based on priorities and data referenced in the plan. Traffic safety investment plans will be developed using the SHSP as a reference. Trauma care professionals will seek to improve the health outcomes and survivability of those involved in crashes. Advocates will use the plan to tailor their outreach efforts. Communities will look to the SHSP for keeping their young and old alike aware of traffic safety. The plan is intended to guide the safety efforts of all Minnesotans during the next several years.

Everyone has a stake in preventing crashes. The AAA Foundation for Traffic Safety has conducted a national survey of traffic safety culture each year since 2008. Its most recent study reports that

The SHSP will guide all Minnesota traffic safety efforts.

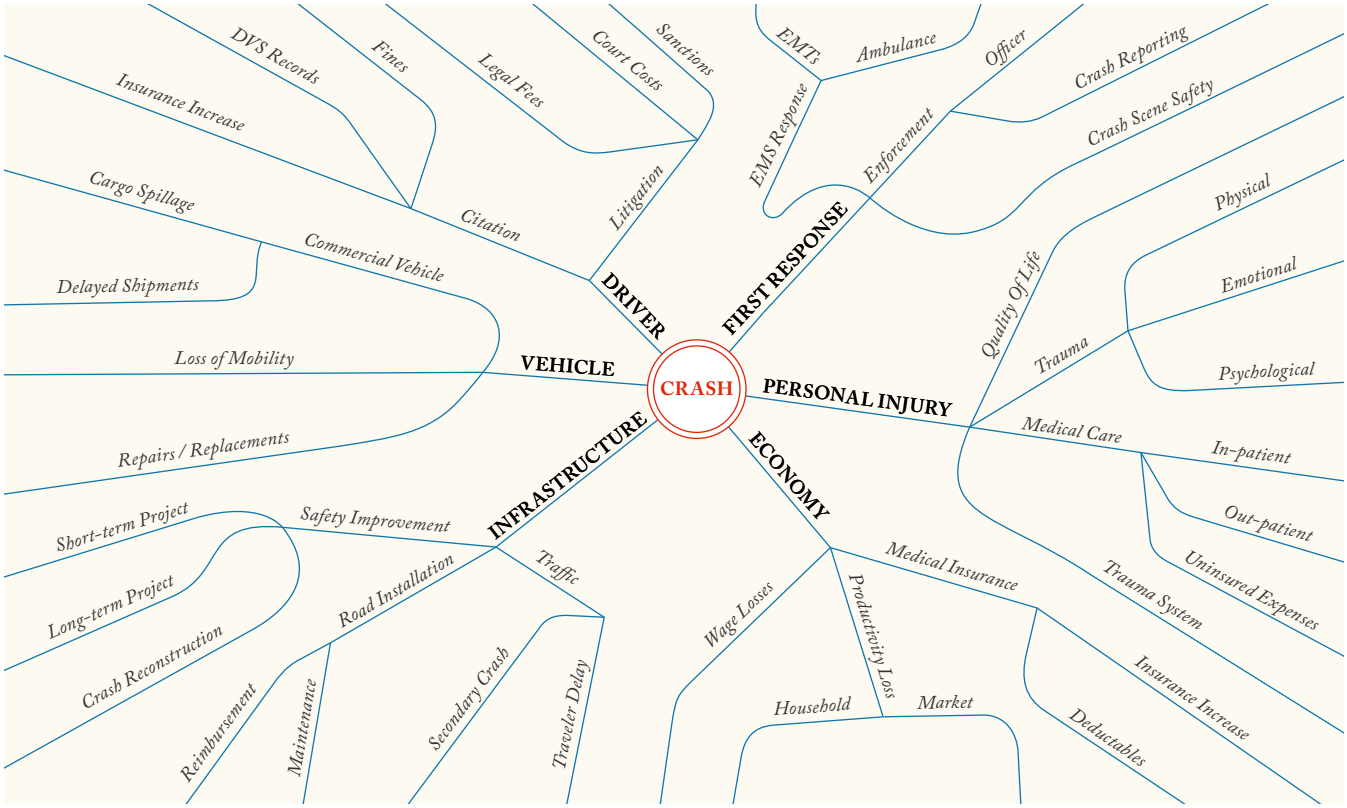


Figure 2: One crash with a web of consequences that impact everyone.

Two in five Americans report having been impacted by a serious crash.

nearly half of all Americans have been touched in some way by a serious motor vehicle crash at some point in their lives. More than two in five Americans (41.7 percent) report having been involved in a serious crash, having had a friend or relative seriously injured or killed in a crash, or both. (AAA Foundation for Traffic Safety, 2014) Although crash impacts may be obvious for those directly involved in them, crashes eventually affect everyone through higher insurance rates, infrastructure repairs, economic loss and much more.

Minnesota has been successful in reducing fatal and serious injury crashes. Nationally, it had the second lowest traffic fatalities per 100 million vehicle miles traveled in 2011 and saw a 41 percent decrease in traffic fatalities between 2000 and 2011. (National Highway Traffic Safety Administration, 2013) Much of Minnesota's success during the past decade can be attributed to the formation of the Toward Zero Deaths program in 2003. The mission of TZD is to create a culture in which traffic fatalities and serious injuries are no longer acceptable through the integrated application of education, emergency medical and trauma services, enforcement and engineering. In 2013, TZD celebrated a decade of progress that included policy milestones such as lowering the blood alcohol content for DWI to 0.08, outlawing electronic communications while driving, expanding graduated driver licensing and implementing a primary seat belt law.

Additional information about these and other traffic safety laws throughout the United States is available through a variety of sources including the Governor's Highway Safety Association and the Insurance Institute for Highway Safety. Each summarizes state laws and regulations on topics such as automated enforcement, helmet use, speed limits and other traffic safety issues.

Create a culture in which traffic fatalities and serious injuries are no longer acceptable.

Key Minnesota Traffic Safety Laws

- Drivers and all passengers must be buckled up or in the correct child restraint. (M.S. 169.686)
- All children under age eight must ride in a federally approved car seat or booster seat, unless the child is four feet nine inches or taller. (M.S. 169.685)
- Legal alcohol-concentration driving limit is 0.08 — but motorists can be arrested for DWI at lower levels. (M.S. 169A)
- It is illegal for a person under age 21 to drive after consuming any amount of alcohol. (M.S. 169A.33, M.S. 169A.20)
- It is illegal for drivers of all ages to compose, read or send electronic messages or access the Internet on a wireless device when the vehicle is in motion or part of traffic. (M.S. 169.475)
- It is illegal for drivers under age 18 to use a cell phone, whether hand-held or hands-free, except to call 911 in an emergency. (M.S. 171.05, 171.055)
- For the first six months of licensure, only one passenger under age 20 is permitted, unless accompanied by a parent or guardian. (M.S. 171.055)
- Distracted drivers can be ticketed for reckless or careless driving when their actions demonstrate a disregard for the safety or rights of others. (M.S. 169.13)
- Every driver must drive at a speed that is reasonable and prudent under the conditions. (M.S. 169.14)
- When traveling on a road with two or more lanes, drivers must stay one full lane away from stopped emergency vehicles – ambulance, fire, law enforcement, maintenance and construction – with flashing lights activated. (M.S. 169.18)
- Motorists must maintain a three-foot clearance when passing a bicyclist. (M.S. 169.18)
- Motorists must treat every corner and intersection as a crosswalk, whether it is marked or unmarked, and drivers must stop for crossing pedestrians. (M.S. 169.21)

Minnesota's Traffic Safety Goal:

ZERO DEATHS

Minnesota's 2020 Target:

Fewer than

300 Deaths

Source: Minnesota Department of Public Safety. Minnesota Motor Vehicle Crash Facts.

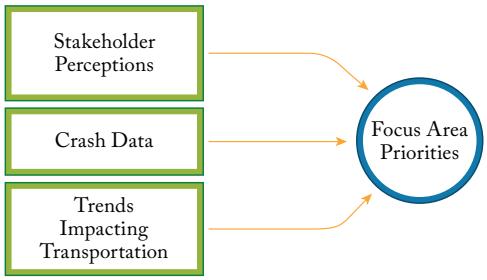
Progress with improving roadway safety has also been made through the installation of more than 300 miles of cable median barrier and more than 5,000 miles of rumble strips to prevent lane departure crashes. Further progress has been achieved with patient care following a crash, including legislation that created a statewide trauma system and network of regional and local trauma centers. The dramatic decrease in traffic fatalities on Minnesota roads is proof of how effective these collaborative efforts have been.

In 2013, the TZD program took to the streets to ask Minnesotans firsthand what they thought the state's goal should be for traffic fatalities each year. Responses ranged from five to 500, which may reflect an acceptance that crashes are going to happen and a general feeling that zero deaths may be unattainable. However, when asked what the goal should be for traffic fatalities within their families, the resounding answer was zero. (Minnesota Toward Zero Deaths Program, 2013) Although crashes are likely to happen in the future, the pursuit of zero deaths is the only acceptable goal. As Minnesotans recognize that crashes truly do affect everyone, the culture around traffic safety also will change to reflect awareness that everyone will play a part in reaching zero deaths.

Minnesota's crash profile

The analysis of motor vehicle crash data was an important state in the development of this SHSP, but it was just the first step in determining priorities among the focus areas. Crash data also were combined with information about trends affecting transportation in the future, as well as with feedback from stakeholders facing safety issue in the present. Combining crash data with trends and stakeholder perceptions provided well-rounded information that was used to set Minnesota's focus area priorities.

Figure 3: Factors Used to Establish Focus Area Priorities



Crash data

Minnesota's motor vehicle crash records date back to 1910 when only 23 people died in traffic crashes that year. (Minnesota Department of Public Safety, 2012) As popularity of the automobile grew and more miles were traveled, thousands of lives were lost. Traffic fatalities escalated throughout the century to a high point in 1968 when, in that one year, 1,060 people died in traffic crashes. Since the turn of the new century, fatalities have been on the decline. In 2011, there were 368 people killed in traffic crashes – the fourth consecutive annual decrease in traffic fatalities and the first time since 1944 that fewer than 400 people died on Minnesota roads.(Minnesota Department of Public Safety, 2012) This also meant that Minnesota had reached the intermediate target of fewer than

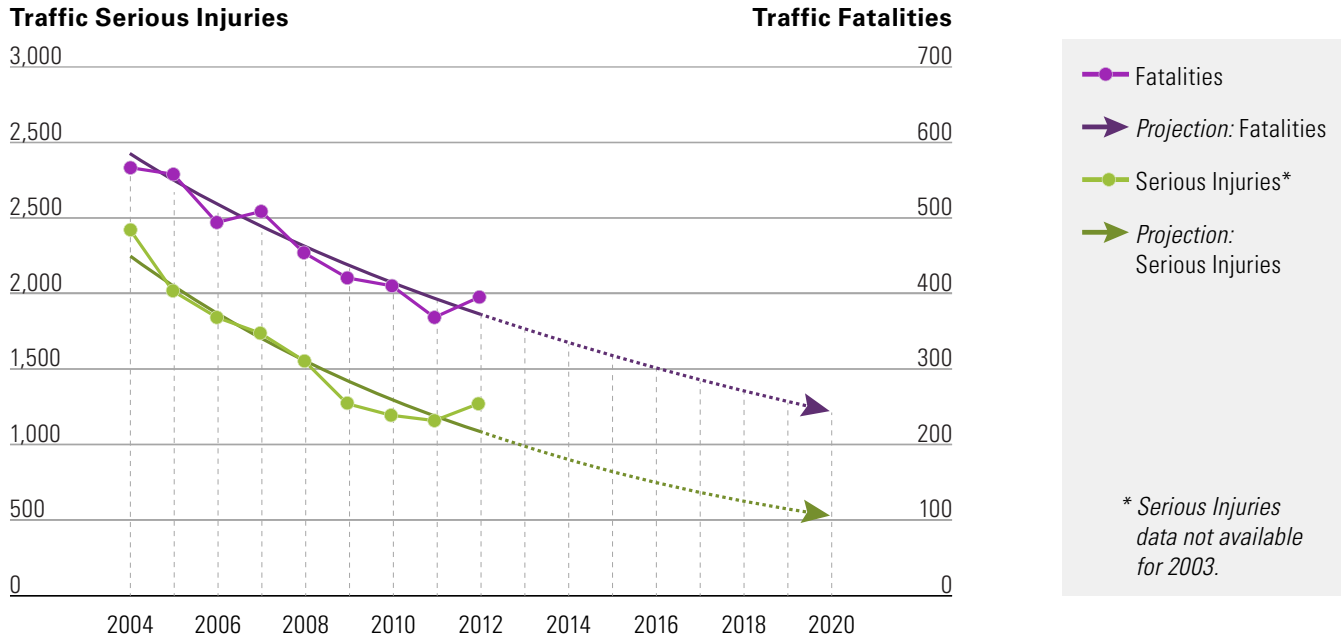
In 2011, Minnesota reached its target for fewer than 400 deaths.

400 deaths that was established in the 2007 SHSP.

Fatal crashes are carefully investigated by law enforcement to identify what caused them and to record that information in a crash report. Reports for all crashes that result in death, injury or property damage greater than $1,000 are collected in one database so that broader data analyses can be done. The Minnesota Department of Public Safety maintains crash records for all Minnesota roads and annually publishes Minnesota Motor Vehicle Crash Facts to provide a summary of statistical information about the crashes. This information can then be used in conjunction with resources like the SHSP to determine how crashes may be prevented in the future.

Crash data from 2004 to 2012 were analyzed to understand the nature of recent crashes and the potential for future crashes on Minnesota roads. Analysis was completed in early 2013, before 2012 crash figures were finalized. The data were first analyzed to understand how many fatal and serious injury crashes have happened in recent years and then to project how many crashes may happen in future years. Fatal crashes are those that involve an injury resulting in death within 30 days of the crash. In comparison, serious injury crashes involve injuries that prevent a person from walking, driving or normally continuing the activities they were capable of performing before the injury occurred. Fatal and serious injury crashes are closely monitored because they have the most significant emotional and economic impacts on society. The 2012 Minnesota Motor Vehicle Crash Facts, using conservative cost figures from the National Safety Council, estimated the cost of one fatal crash at

Figure 4: Minnesota Traffic Fatalities and Serious Injuries 2003 -2012 and Observed Projections through 2020



$1,420,000 and the cost of one serious injury crash at $70,500. The 395 traffic deaths alone in 2012 cost approximately $560,900,000 and the overall economic loss for all traffic crashes in 2012 was $1,513,639,100. (Minnesota Department of Public Safety, 2013)

A more recent subset of the data from 2008-2012 was next reviewed to understand where crashes have happened. There were 7,071 fatal and serious injury crashes in that timeframe. Likewise, 60 percent of the fatal and serious injury crashes happened on roads outside of the Twin Cities metropolitan area.

The 395 traffic deaths in 2012 cost an estimated $560,900,000.

Data were further analyzed to identify what types of crashes have occurred most frequently. The factors that contribute to crashes are grouped into a series of focus areas that are used to describe and analyze crash types. The 7,071 fatal and serious injury crashes that occurred from 2008-2012 were most commonly categorized in the lane departure, intersection, unbelted or impairment focus areas. Because some crashes are categorized in multiple focus areas, there are more than 7,071 crashes total noted in the following table.

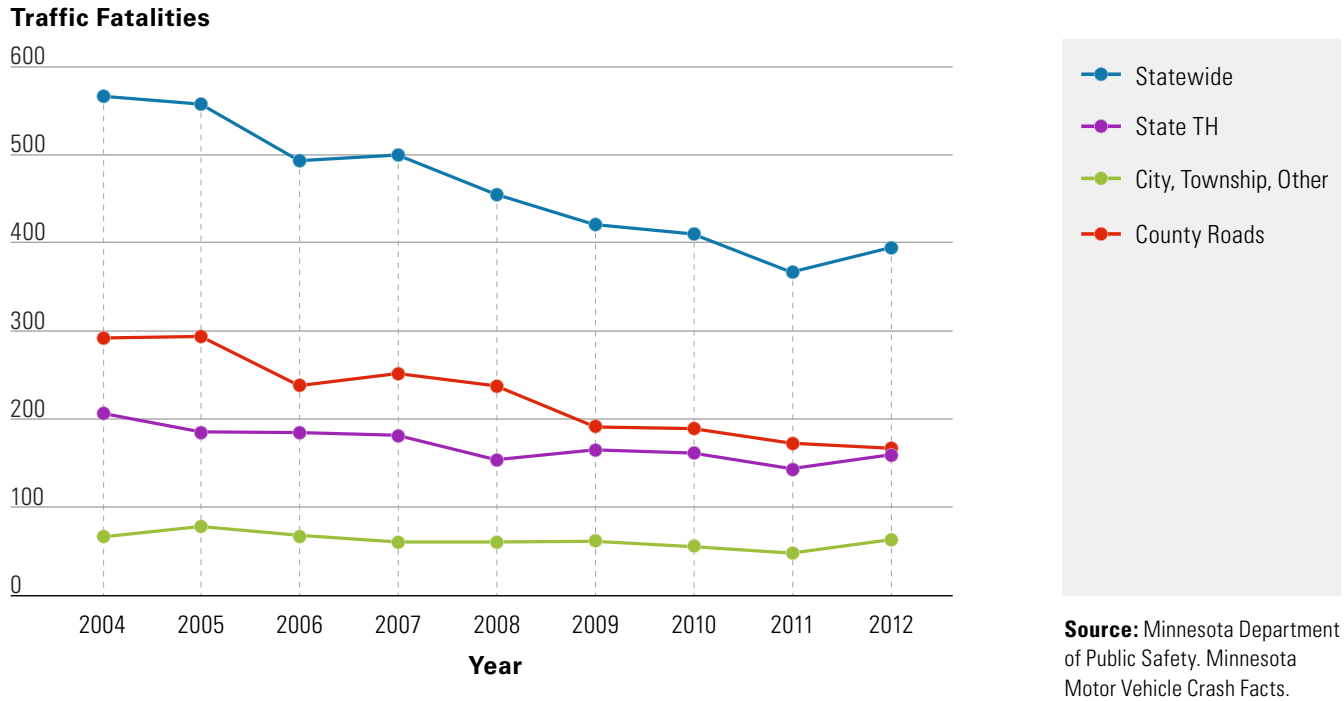
The focus areas are often deeply intertwined. For example, a 17-year-old driver may be speeding and distracted, which causes them to leave their driving lane and strike a bicyclist. This one crash involves several of the focus areas typically highlighted in crash data – younger drivers, speed,

Table 1: Statewide Fatal and Serious Injury Crashes by Focus Area (2008-2012)

Focus Area	Crashes	Percent
Lane departure	3,199	45.5%
Intersection	2,945	41.9%
Unbelted occupants	2,463	35.0%
Impaired roadway users	1,850	26.3%
Younger drivers	1,367	19.4%
Inattentive drivers	1,319	18.7%
Speed	1,309	18.6%
Motorcyclists	1,244	17.7%
Older drivers	1,028	14.6%
Commercial vehicles	714	10.1%
Unlicensed drivers	702	10%
Pedestrians	649	9.2%
Bicyclists	286	4.1%
Work zones	103	1.5%
Trains	21	0.3%

Source: TIS Crash Data, MnDOT. Oracle, 3/26/13

Figure 5: Minnesota Fatalities on Minnesota Roads 2008-2012



Source: Minnesota Department of Public Safety. Minnesota Motor Vehicle Crash Facts.

inattentive drivers, lane departure and bicyclists. Although speed and driver inattention may have led to the crash in this example, the other factors involved are also important. The crash data were further analyzed to identify positive correlations among crash characteristics and to further understand how the focus areas may be prioritized. Positive correlations occur when a particular crash characteristic is strongly associated with another. As such, crashes in one focus area tend to increase or decrease proportionately in relation to crashes in another focus area. For example, fatal and serious injury crashes at intersections are strongly correlated with inattentive drivers, commercial vehicles, younger and older drivers, bicyclists and pedestrians. This means that when a crash occurs at an intersection, it often is correlated to one of these other focus areas, which in turn means that efforts to decrease intersection crashes will most likely lead to fewer crashes within the correlated focus areas. In contrast to intersection crashes, there are no strong positive correlations among fatal and serious injury motorcyclist crashes and those in other areas. Although there are certainly fatal and serious injury crashes associated with the motorcyclists focus area, there are not enough to rule out the randomness of their relationship to other focus areas.

The appendices provide additional information about the crash data analyses that were conducted for this plan. It describes data sources and the data dictionary that were used during analyses. It also provides additional resources, particularly for safety professionals, to further analyze how many, where and what type of crashes have occurred throughout the state.

Trends

Crash data provides a detailed, historical view of how traffic safety has progressed in recent years. In contrast, other trends affecting transportation in general offer another view of what could impact traffic safety in the future.

Minnesota GO presents a 50-year vision for the state's multimodal transportation system that will maximize the health of people, the environment and the economy. The transportation system is, among other things, envisioned to provide safe, convenient, efficient and effective movement of people and goods. The vision further emphasizes that safety will be systematically and holistically applied to all forms of transportation. It will be proactive, innovative and strategic. There are several trends highlighted in both Minnesota GO and the Statewide Multimodal Transportation Plan that will likely affect safety during the next several years.

- *Aging and Increasingly Diverse Population.* The peak of the baby-boom generation will be 65 years and older, and they are expected to continue driving personal vehicles even though the destinations, travel times and number of trips they make will change. Minnesota's population is also becoming more ethnically and culturally diverse. Both of these issues must be considered when anticipating future safety challenges and introducing new safety strategies.

- *More Minnesotans Live in Urban Settings.* More than half (54 percent) the state's population lives in the seven-county Twin Cities metropolitan area. Jobs and services being consolidated in regional center and access to transit, walking and biking facilities will continue to enhance the appeal of urban living. Data and trends about where people live must be considered in relation to crash records that show more than half of the fatal and serious injury crashes occur on roads outside the Twin Cities.

- *Transportation Technology.* New technology is continuously being introduced on roads and in vehicles. Roadside sensors and dynamic signs can provide real-time warnings to drivers. Sensors in the vehicle can assist drivers with cruise control, lane keeping and braking. Although it is still unclear if there will ever be a system of fully autonomous vehicles, the technology already being introduced to roads and vehicles will continue to improve safety.

- *Health Impacts.* As obesity and associated healthcare costs increase, health professionals are encouraging Minnesotans to choose more active lifestyles. This could mean that more people will bike and walk in the future and the safety effects should be considered.

- *Increased Global Competition.* As the global population increases, competition for water, food, energy, materials and human resources is also increasing. Minnesota businesses must be able to compete for these resources in the global market. Increased competition will naturally increase the demand to move more goods and services faster. The growing demand to move faster must also be balanced with the need to maintain safety.

Figure 4: Minnesota TZD Regions

These and other social trends will have a strong impact on traffic safety. When Minnesota's 2007 SHSP was developed, distraction was identified as a trend that could grow in the future, but the challenge of texting while driving was not yet identified as a specific issue for distraction. Texting in general has since grown at a phenomenal rate. CTIA-The Wireless Association estimates the number of monthly text messages in 2007 was 48.1 billion. By 2012, that number had grown 256 percent to 171.3 billion. (CTIA-The Wireless Association, 2013) According to the Pew Research Center, all text messaging users sent or received an average of 41.5 messages per day in 2011 – a 40 percent increase from 29.7 messages per day in 2009. In contrast, young adults (age 18-24) sent or received an average of 109.5 text messages per day in 2011. (Smith, 2011) This issue has drawn tremendous attention in more recent years. Most states, including Minnesota, have passed laws banning texting while driving and numerous safety campaigns have been sponsored by the United States Department of Transportation, the insurance industry and cell phone companies.

Stakeholder perceptions

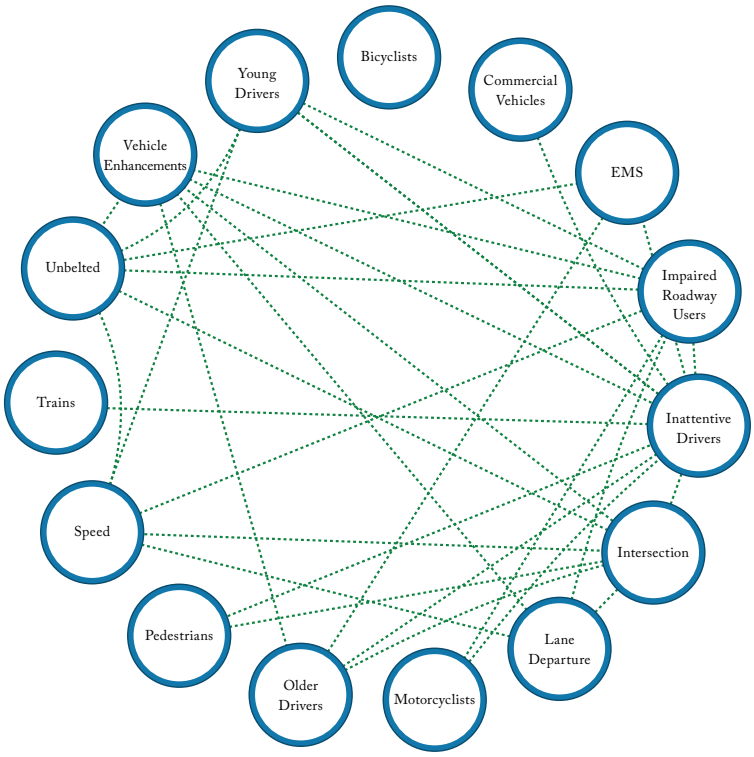
Knowing that everyone must play a role in reaching Minnesota's ultimate goal of zero traffic deaths, stakeholder perceptions of future safety priorities were also sought in the development of this plan.

Everyone must play a role in reaching the goal of zero deaths.

In recognition of the 10-year anniversary of TZD, the Minnesota Department of Transportation asked their Online Community in early 2013 to share its thoughts on the biggest challenges ahead for TZD and how to continue changing traffic safety culture for the better. Although participants understood there is always more that can be done with traffic safety, they believed that continuing current efforts will help in the future. In the next 10 years, they also noted that TZD will need to continually adjust to advancements in technology and identify new ways to support safe driving. Participants called for stronger, more actionable laws and continued efforts to spread public awareness of the dangers of unsafe driving. (Minnesota Department of Transportation, 2013)

Input was next sought from traffic safety leaders during a 2013 strategic visioning workshop. The workshop encouraged discussion of how to advance Minnesota's traffic safety agenda by developing strategies to move the state toward zero deaths. The visioning workshop participants provided the initial input on future priorities for traffic safety focus areas. Additional stakeholder feedback also was gathered during a series of regional TZD workshops held throughout Minnesota from May to June 2013. More than 700 stakeholders attended the regional workshops, representing a range of safety interests including enforcement, emergency medical and trauma services, engineering, education, judicial, advocacy, child passenger safety, communities, research, academia, media and elected officials. Workshop participants also represented federal, state, local and tribal levels of government.

Figure 5: Stakeholder Perceptions of Focus Area Correlations (Game of Loans Exercise Results)



Stakeholders participated in two structured exercises designed to gather individual and collective feedback on focus area priorities and relationships. The first exercise, Would You Rather, was designed to reveal stakeholders' true values about traffic safety. The goal of the exercise was to individually prioritize focus areas within the current traffic safety environment. Stakeholders compared each focus area to the others and they were asked for each comparison to select which focus area was most important to reducing fatal and serious injury crashes. For example, they were asked to select if unbelted occupants or inattentive drivers are more important to reducing crashes. The results showed a subjective ranking of priorities among the focus areas.

The second exercise, Game of Loans, was designed to gather stakeholder perspectives on focus area priorities as they relate to leveraging resources and relationships. The goal of the exercise was to encourage global thinking about existing and potential traffic safety partnerships given limited resources. Stakeholders were randomly assigned to focus areas and asked to work as a group for the exercise. Each group was then given basic crash data about their focus area and six SHSP dollars to spend. Their task was to invest their funds in the other focus areas that would most likely reduce fatal and serious injury crashes. The results of this exercise showed where stakeholders perceived correlations among the focus areas.

Additional input was gathered through a series of less formal meetings with stakeholders representing specific focus areas. For example, a meeting with several bicycle and pedestrian organizations was hosted by Transit for Livable Communities to discuss priorities and specific strategies for improving safety in the bicycle and pedestrian focus areas. Periodic meetings were also held with directors from Minnesota's metropolitan planning organizations to update them on progress with SHSP development and to identify regional plans that should be reviewed for safety strategies. These supplemental meetings were typically held when requested by a stakeholder group or when additional feedback was needed on a specific issue related to developing the SHSP.

Information from all of the stakeholder interactions was shared with a steering committee that represented broader stakeholder group interests and provided guidance on development of the SHSP.

The steering committee reviewed stakeholder feedback, trends and crash data, and made the final decision about Minnesota's focus area priorities for the next several years.

Table 2: Stakeholder Perceptions of Focus Area Priorities

Focus Area	Would You Rather Priority
Unbelted occupants	HIGH
Impaired roadway users	HIGH
Inattentive drivers	HIGH
Younger drivers	HIGH
Intersection	MEDIUM
Lane departure	MEDIUM
Speed	MEDIUM
Older drivers	MEDIUM
Motorcyclists	MEDIUM
Commercial vehicles	LOW
Pedestrians	LOW
Bicyclists	LOW
Trains	LOW

Focus area priorities

There are many different modes of transportation to accommodate on Minnesota roads - cars, commercial vehicles, buses, trains, bicycles, pedestrians and even ridden animals. Creating a safe environment for all these different modes is challenging because of their great differences in size, speed, mobility and purpose. The SHSP addresses all of these modes as they result in motor vehicle crashes. The focus areas represent key factors that contribute to motor vehicle crashes and provide context for setting future traffic safety priorities. The focus area priorities were established after careful review of crash data, trends and stakeholder perceptions to ensure a data-driven result that will be understood and supported by everyone. As demonstrated in the crash data analyses and stakeholder discussions, focus areas are often correlated with one another as crashes in one focus area can have a similar positive or negative effect in another. For this reason, the priorities established in this plan are inclusive of all the focus areas to reflect the nature of these relationships.

Traffic safety culture and awareness

Traffic safety culture can be defined as the values, beliefs, frames, norms and attitudes shared by a group of people that influence individual decisions regarding driving behaviors and safety interventions. (Eiksund, 2009) Awareness of traffic safety issues can ebb and flow depending on educational and outreach efforts at a given point in time. In contrast, culture changes gradually over time and requires constant exposure to traffic safety issues across multiple levels of society – school, work, family life, social life and communities in general.

Intersections

Crashes that occur where two or more roadways intersect. From 2008-2012 most fatal and serious injury crashes occurred in urban areas (60 percent).

Lane departure

Crashes that involve vehicles leaving their original lane of travel, including run-off-the-road, head-on and sideswipe collisions. Sixty-five percent of the fatal and serious injury lane departure crashes from 2008-2012 occurred in rural areas.

Unbelted

Drivers or passengers who are not restrained in the appropriate fashion based on age or weight. Fatal and serious injury crashes involving unbelted or improperly restrained occupants from 2008-2012 primarily occurred in rural areas (61 percent).

Impaired roadway users

Persons using the road who are under the influence of alcohol, illicit drugs or prescription drugs. Most fatal and serious injury crashes (58 percent) involving impairment from 2008-2012 occurred on rural roads.

Inattentive drivers

Drivers who are not focusing on the task of driving because of distractions, such as talking on the phone, texting or drowsiness. The majority of fatal and serious injury crashes involving inattentive drivers from 2008-2012 happened during daylight, when the weather was calm and the roadway was dry.

Speed

Drivers who are driving aggressively, over the posted speed limit or too fast for conditions. The probability of death or serious injury grows with higher speed at impact. Speeding is a notable challenge on both state and local roadways, as well as in both rural and urban areas.

Older drivers
Drivers who are over 64 years of age. The number of older drivers will continue to increase as the "baby boomer" generation ages and continues to drive. Older drivers involved in fatal and serious injury crashes from 2008-2012 were more likely to be involved in a collision with another vehicle than any other roadway objects.

Younger drivers
Drivers who are under 21 years of age. Newly licensed drivers with less than a year's experience are particularly vulnerable to crashes. A lack of driving experience and a tendency toward risk taking also contribute to crashes involving younger drivers. A majority of the fatal and serious injury crashes involving younger drivers from 2008-2012 occurred during the day and when the roadway was dry.

Motorcyclists
Drivers and passengers on motorcycles. Motorcyclists between the ages of 36 and 65 made up 60 percent of those involved in fatal and serious injury crashes from 2008-2012.

Pedestrians
All persons walking, skating, exiting from vehicles or operating a mobility assistance device (e.g., wheel chair) on public roadways. More than half (52 percent) of fatal and serious injury pedestrian crashes from 2008-2012 occurred at night or under dark conditions.

EMS and trauma systems
All response and emergency treatment systems involved in caring for victims of traffic crashes. As of January 2014, Minnesota Department of Health records showed that 126 of 131 acute care hospitals have been designated as trauma centers.

Data management
Fundamental data and systems used to evaluate traffic safety. Crash, vehicle, driver, roadway, citation/adjudication, and injury surveillance are fundamental data elements identified for use in highway safety performance measurement. Data management also includes metadata, data quality parameters and effective application of data in decision making.

Management systems
Traffic safety governance is divided among multiple agencies including transportation, public safety and health. Management systems encompass the policies, processes and management approaches that integrate engineering, education, enforcement, emergency services and other disciplines.

Bicyclists
All persons riding a bicycle on a street, trail, bike lane or sidewalk who are struck by a motor vehicle. A majority (85 percent) of all fatal and serious injury crashes involving bicyclists from 2008-2012 occurred in urban areas.

Commercial vehicles
Vehicles requiring a Class A driver's license, including all heavy commercial vehicles and buses. Half of the fatal and serious injury commercial vehicle crashes from 2008-2012 were intersection-related.

Trains
Motor vehicle crashes involving trains. Fatal and serious injury crashes involving trains almost exclusively occurred in rural areas (86 percent) from 2008-2012.

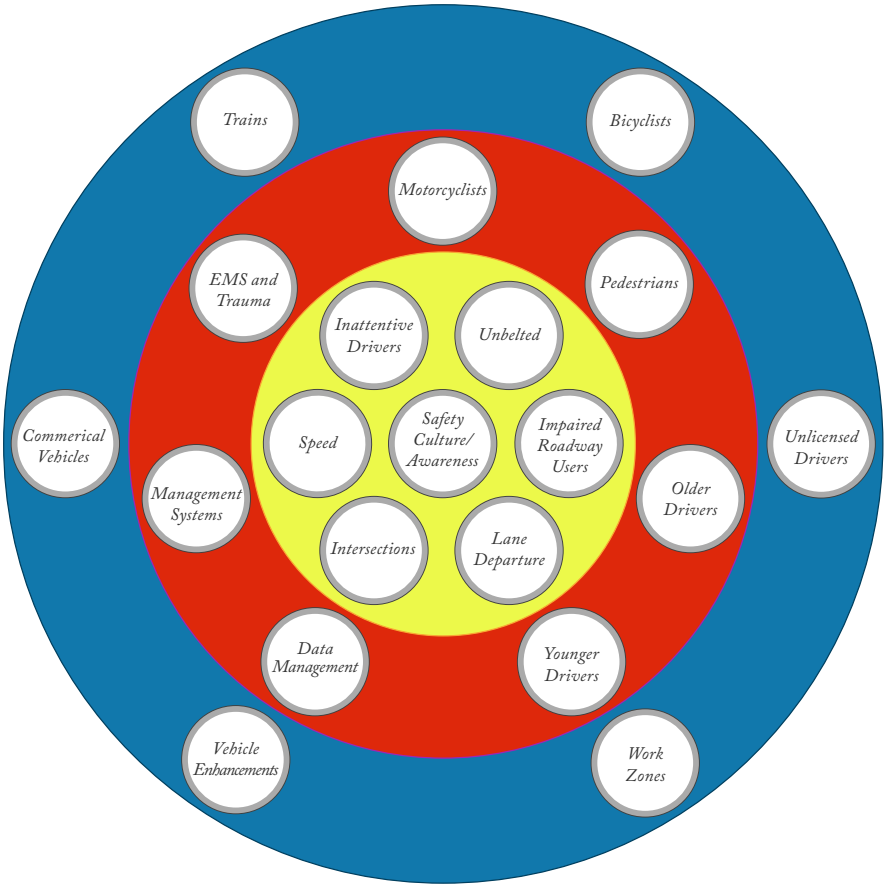
Work zones
Work zones are a necessary part of building and maintaining roads. They require increased attention from drivers as they often involve restricted lanes or speeds. Fatal and serious injury crashes in work zones from 2008-2012 primarily (41 percent) occurred on state roadways in urban areas.

Unlicensed drivers
Drivers who are without a license or with a license that has been suspended, revoked, expired or canceled. Seventy-eight percent of the unlicensed drivers involved in fatal and serious injury crashes from 2008-2012 were male and 52 percent were between the ages of 21 and 35.

Vehicle safety enhancements
Select features in vehicles that can be added or optimized to provide increased safety for vehicle occupants. Such features may include airbags, stability control or lane departure alerts.

The image of a target was used during the development of this plan to emphasize the importance of considering impacts in all the focus areas as priorities were established. The target also acknowledges that some focus areas will naturally require higher priority than others during the next several years. Higher priority focus areas, for example, will be given some preference when it comes to resources. More emphasis will also be placed on tracking the performance of higher priority areas. Nevertheless, addressing all of the focus areas in this plan prevents the exclusion of an area simply because it has a lower number of crashes. The combined information from crash data, trends and stakeholder feedback points to the need for continued emphasis on behavioral and roadway focus areas at the center of

Figure 6: Focus Area Priorities



the target. Although notable reductions have been made in each of these areas in recent years, a majority of the fatal and serious injury crashes on Minnesota roads still fall into these focus areas.

Moreover, public attitudes around traffic safety do not yet reflect the culture of intolerance toward death that may be needed to eventually reach zero deaths. Nationally, the 2013 Traffic Safety Culture Index sponsored by the AAA Foundation for Traffic Safety reports that although many Americans seem to think traffic safety is important generally, the survey findings also reveal some aspects of a culture of indifference, with drivers effectively saying "Do as I say, not as I do." For example, substantial numbers of drivers say that it is completely unacceptable for anyone to drive when they are so sleepy that they have trouble keeping their eyes open, yet those same drivers admit to doing so anyway. (AAA Foundation for Traffic Safety, 2014) As such, traffic safety culture and awareness is the most fundamental focus area for Minnesota's safety community to address in coming years.

Additional information about the focus areas, including where, when and how often crashes occur within each is included in the appendices. This information is intended to provide a deeper look, especially for safety professionals, at the nature of the crashes associated with each focus area.

Traffic safety culture is reflection of values from multiple levels of society.

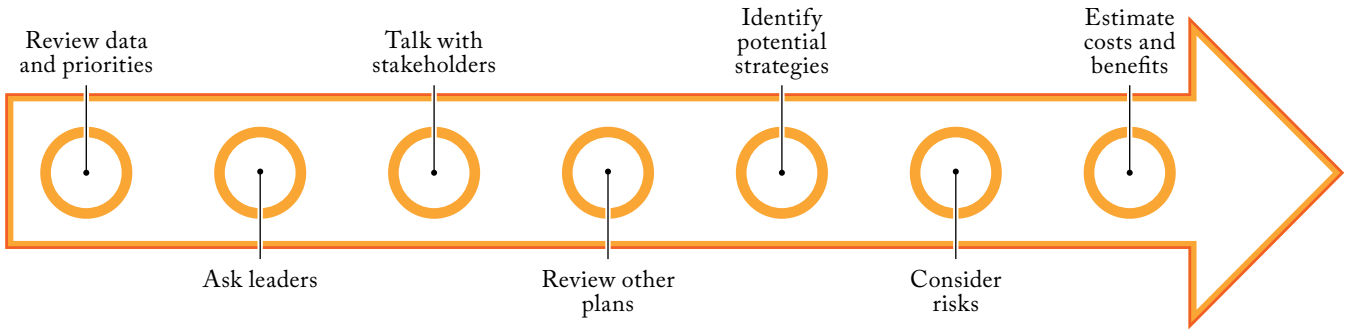
Strategies to keep moving toward zero

The SHSP is a policy plan that sets an overall direction for future safety strategies and presents a framework for selecting strategies that will be included in safety-related investment plans.

Minnesota has successfully implemented strategies in recent years that have led to significant reductions in fatal and serious injury crashes. The installation of cable median barriers, passage of a primary seat belt law and execution of targeted driver education and enforcement campaigns are just a few strategies that have contributed to that success. The SHSP emphasizes the investment in top performing strategies like these to maximize the reduction of fatal and serious injury crashes while being attentive to innovation. This direction should be applied to a framework for selecting strategies that will maximize outcomes among the focus area priorities. The following framework was used during the development of the SHSP and is recommended as an approach for selecting strategies that will maximize the reduction of fatal and serious injury crashes.

Invest in top performing strategies to maximize the reduction of fatal and serious injury crashes.

Figure 7: Selecting Safety Strategies



Review data and priorities

The framework for selecting strategies begins with carefully reviewing crash data to understand priorities. The data presented in this plan were analyzed over several years for frequency, patterns and trends across the focus areas, regions, roadway types and conditions. The crash data analyses were combined with information about other transportation trends and then further blended with input from stakeholders to establish focus area priorities for the state. These priorities were established to guide investments and provide a focal point for performance that will ultimately maximize the reduction of fatal and serious injury crashes.

Ask leaders

Political and technical, local and national – there is a variety of leadership positions that can influence the selection of safety strategies. Identifying strategies for this SHSP began with asking key safety leaders attending an April 2013 visioning workshop for their ideas about future safety strategies. Some of those ideas included strategies

for attracting more partners to the TZD program, developing incentives for good driving behavior, ensuring technology is consistently implemented to minimize driver distraction, and getting crash information to safety professionals more quickly. Engaging leaders at the beginning of the process to identify safety strategies is important but it is also wise to keep leadership engaged as strategies are selected, implemented and evaluated. Leaders can play a valuable role in making others aware of the effectiveness of particular strategies and support broader implementation of them.

Talk with stakeholders

Stakeholders at the local level often include traffic engineers, law enforcement officers, paramedics, public health educators, judges, media, community residents and many others. Stakeholders play different roles in the successful implementation of safety strategies and should be engaged in the identification of specific strategies for their community. An online crowdsourcing tool called IdeaScale was used in the development of this SHSP to gather strategies from stakeholders throughout Minnesota following their attendance at the TZD regional workshops from May-July 2013. More than 100 stakeholders elected to join this online SHSP community to offer their own traffic safety strategies and provide comments or votes on others' strategies. The most popular strategies involved a range of educational efforts, including pre-driver education on traffic safety, enhanced novice driver education, young adult (ages 21-30) safe driving programs, and refresher training for drivers over age 55. Social media and other online tools like IdeaScale can broaden the participation of stakeholders in the selection of safety strategies which strengthens the likelihood of successful implementation.

Review other plans

Traffic safety is such a pervasive topic that many plans identify strategies associated with it. In recognition of the need to coordinate strategies that will maximize outcomes, this SHSP identifies a core set of plans that contain traffic safety strategies. Some of the plans were specifically identified by the Federal Highway Administration, which requires an SHSP to consider the results of state, regional or local transportation and highway safety planning processes. These include the Highway Safety Plan, Commercial Vehicle Safety Plan, Statewide Transportation Plan, Metropolitan Transportation Plans and local road safety plans. Other plans were selected for their relevance to specific focus areas. Further information about the other plans reviewed in the development of the SHSP is presented in the next section. Although these plans were reviewed to identify strategies for the SHSP, coordinating the implementation of strategies across plans will need to be sustained by agency leadership, traffic safety staff and active participants in the TZD program as strategies in the coming years.

Identify potential strategies

After talking with leaders and stakeholders, potential strategies should be identified to address priority focus areas. More than 500 traffic safety strategies were identified in the development of the SHSP. Some are proven, while others have been tried with some success. Still other strategies are considered experimental or are simply the ideas of passionate stakeholders stretching the limits of creative thinking. The appendices present a list of potential strategies as they were taken from other plans and as they were suggested by stakeholders. All of the strategies are categorized by the focus areas they are most relevant to. The list is intended to be an initial reference point for stakeholders wishing to champion safety improvements. It is important to note that the strategies are not presented by merit of effectiveness, cost or benefit. Rather, they are presented as a pool of ideas that may address crash problems within certain focus areas. Further consideration must be given to selecting specific strategies that can be successfully implemented to maximize the reduction of fatal and serious injury crashes.

In addition to the pool of potential strategies presented in the appendix, there are published resources that should also be used in the identification and final selection of potential safety strategies. The National Cooperative Highway Research Program published NCHRP Report 500 to identify proven, tried and experimental strategies for specific focus areas. NCHRP Report 500 consists of a series of guides to assist state and local agencies in reducing injuries and fatalities in targeted areas. Each guide includes a brief introduction, a general description of the problem, the strategies to address the problem and a model implementation process. Furthermore, the National

Highway Traffic Safety Administration publishes Countermeasures that Work as a basic reference to assist in the selection of effective, evidence-based countermeasures for traffic safety problem areas, particularly those that are behaviorally based. The guide describes major strategies and countermeasures; summarizes strategy use, effectiveness, costs and implementation time; and provides references to supporting research.

Consider risks

Once potential strategies are identified, they should be further reviewed for risks. Risks can be associated with a variety of factors but the most common involve stakeholder acceptance, costs and safety effectiveness. When following the direction to select strategies that maximize the reduction of fatal and serious injury crashes, it is important to consider if focusing resources on strategies that only tackle high priority focus areas could limit the ability to address urgent issues that may arise in other focus areas. Stakeholder support of or opposition to selected strategies should also be considered, particularly for any strategies that require changes in law or policy. For example, one seemingly simple solution to drivers being distracted by cell phones is to completely outlaw their use in the vehicle. However, the complex reality of this solution would likely result in strong public opposition as many believe talking on the phone in their car is a necessity for convenience and safety. Maintaining open and routine communication about how and why strategies are chosen will minimize the potential for opposition.

Estimate costs and benefits

Focusing investments on select strategies that are expected to maximize the reduction of fatal and serious injury crashes requires careful estimation of costs and benefits to further ensure success. Estimating costs and benefits can be fairly straightforward for engineering-oriented strategies that prevent intersection and lane departure crashes because they are rooted in easily identifiable crashes and extensive research designed to specify crash reduction factors. For example, the costs and benefits of edge line rumble strips to prevent lane departure crashes can be estimated using this process. First, identify the number of fatal and serious injury crashes over several years within the lane departure focus area. This represented the potential pool of crashes that the strategy could affect. Next, identify the type of roadways and number of miles where the crashes occurred. Then, apply a crash reduction factor for the strategy. Crash reduction factors are established through research for proven strategies and through reasonable estimation for those strategies that have been tried or are still experimental. The final variables identified are installation costs and how many miles of rumble strips will be deployed. Combining the crash data, roadway data, crash reduction factor and deployment details produces an estimated reduction in crashes. Estimating costs and benefits with a structured process such as this also creates an opportunity to look at various levels of deployment to determine which is optimal at a given point in time.

Alternate approaches to estimating costs and benefits may be needed for strategies that emphasize education and enforcement to change driver behavior and prevent crashes in focus areas such as inattentive or impaired driving. These strategies are designed to change behavior over time and they do not necessarily produce a physical result that can be directly quantified. This does not diminish the value or potential effectiveness of the strategies; it simply makes it more challenging to estimate their potential impact in terms of fatal and serious injury crashes within a specific time period. Through the use of ongoing national research and localized market research, benefits can be and have been estimated for many behavior-based strategies. For example, alcohol ignition interlocks prevent a vehicle from starting unless the driver provides a breath sample lower than a pre-set blood alcohol content level. The publication, Countermeasures That Work, provides a general assessment of the effectiveness, costs, level of use and time to implement for this and many other behavior-based strategies. Effectiveness is primarily measured by reductions in crashes and injuries and based on the amount of evaluation done, consistency of results and applicability across multiple situations. Regardless of which process is used to estimate costs and benefits, all strategies should be reviewed for their potential impacts before implementing them.

Getting everyone safely from A to B

Varying degrees of effort will be made to address all types of crashes but the highest priority focus areas are the most critical making it safer for everyone traveling from one point to the next.. These focus areas have been identified as a priority because of their high number of crashes, relationship with other types of crashes, and trends that indicate a need for near-term attention. Key strategies are highlighted for each of the highest priority focus area to illustrate how fatal and serious injury crashes may be addressed in coming years. This is not a comprehensive list of steps that will be taken; rather, it is a list of example strategies that are expected to maximize the reduction of fatal and serious injury crashes in these critical areas.

Traffic safety culture and awareness

All of the fatal and serious injury crashes that occur on Minnesota roadways are fundamentally tied to the culture around traffic safety. Culture includes the values, beliefs, frames, norms and attitudes that Minnesotans share. It changes gradually over time and through growing awareness of traffic safety issues. This is a new focus area and strategies are only now emerging.

Key Strategies

- Establish a traffic safety culture action team
- Develop workshops for safety leaders and practitioners to establish a common understanding of traffic safety culture
- Complete baseline measurement of Minnesota's traffic safety culture
- Develop an action plan with recommended strategies across safety disciplines and partners

Lane departure

Lane departure crashes include run-off-road, head-on and sideswipe collisions. There were 3,199 such crashes between 2008 and 2012 that resulted in fatalities and serious injuries. This is an average of 640 crashes per year and accounts for 46 percent such crashes during the five-year period. Most closely associated with lane departure crashes are the impaired, unbelted occupants and speed focus areas.

Key Strategies

- Install shoulder and centerline rumble strips
- Install enhanced pavement markings and edge line rumble strips roads with narrow or no paved shoulders
- Provide buffer space between opposite travel directions
- Provider wider shoulders, enhanced pavement markings and chevrons for high-risk curves
- Eliminate shoulder drop-offs, provide safety edges and widen or pave shoulders
- Conduct targeted enforcement events on roadways with greater risk for lane departure crashes

Intersections

There were 2,945 fatal and serious injury crashes at intersections between 2008 and 2012. This is an average of 589 crashes per year and accounts for 42 percent of such crashes during the five-year period. Intersection crashes are also closely related to other focus areas; most notably bicyclists, pedestrians, older drivers, younger drivers and inattentive drivers.

Key Strategies

- Use indirect left-turn treatments and access management to minimize conflicts at divided highway intersections
- Provide dynamic warning signs to alert drivers of conflicts at stop-controlled intersections
- Improve intersection visibility by providing enhanced signing, delineation and lighting
- Provide roundabouts at appropriate locations
- Optimize signal operations with phasing, timing, coordination and clearance intervals
- Supplement conventional red-light running enforcement with traffic signal confirmation lights and other technology enhancements that support enforcement efforts
- Provide targeted public information and education on safety problems at specific intersections
- Conduct targeted enforcement events on corridors with greater risk for intersection crashes

Unbelted occupants

Unbelted occupants include drivers and passengers who fail to wear a seat belt or are improperly restrained in a vehicle. There were 2,463 fatal and serious injury crashes involving unbelted or improperly restrained occupants between 2008 and 2012. This is an average of 493 crashes per year and accounts for 35 percent of all such crashes during the five-year period. Crashes involving unlicensed drivers, speed, impairment and lane departure are frequently related to those involving unbelted occupants.

Key Strategies

- Conduct high visibility seat belt enforcement events linked with paid and earned media at the state, county and local levels
- Conduct additional paid and earned media campaigns to target issues identified in crash data and through market research
- Conduct additional targeted occupant protection enforcement campaigns based on crash and observational data
- Increase emphasis on employer policies requiring seatbelt use
- Provide regional support on the correct use of child safety seats
- Provide free child safety seats to disadvantaged families using dedicated funding

Impaired roadway users

Impairment can be caused by alcohol or drugs – illicit, prescription and over-the-counter. There were 1,850 fatal and serious injury crashes involving impairment between 2008 and 2012. This is an average of 370 crashes per year and account for 26 percent of all such crashes during the five-year period. Crashes in this focus area are closely associated with those in the lane departure, unbelted occupants, unlicensed drivers and speed focus areas. It is also important to note that, contrary to popular belief, these crashes are not as frequently associated with underage drivers.

Key Strategies

- Conduct high visibility impaired driving enforcement events linked with paid and earned media at the state, county and local levels
- Conduct additional paid and earned media campaigns to target issues identified in crash data and through market research
- Increase use of ignition interlocks to reduce repeat DWI offenses
- Increase participation in and the number of DWI and drug courts
- Study the use of screening and brief intervention techniques by the courts for DWI offenders
- Develop and introduce a data and mapping system to assist law enforcement with allocating resources
- Provide technical assistance and support to those who prosecute DWI offenses

Inattentive drivers

Distraction, fatigue and activities other than driving all lead to inattention. There were 1,319 fatal and serious crashes that involved inattentive driving between 2008 and 2012. This is an average of 264 crashes per year and accounts for 19 percent of all such crashes during the five-year period. Most of these crashes also happened during daylight and when weather was mild.

Key Strategies

- Conduct high visibility distracted driving enforcement events linked with paid and earned media at the state, county and local levels
- Conduct additional paid and earned media campaigns to target issues identified in crash data and through market research
- Install edge and centerline rumble strips on at-risk rural roads to alert drivers of possible lane departure
- Install lighting and dynamic warnings at rural intersections to improve visibility of other vehicles and roadway users

Speed

Speeding involves driving aggressively, above the posted limit or faster than conditions warrant. It was a factor in 1,309 fatal and serious injury crashes between 2008 and 2012. This is an average of 262 crashes per year and accounts for 19 percent of such crashes during the five-year period. The impaired, unbelted occupants and unlicensed driver focus areas are frequently related to crashes involving speed.

Key Strategies

- Conduct high visibility speed enforcement events linked with paid and earned media at the state, county and local levels
- Conduct additional paid and earned media campaigns to target issues identified in crash data and through market research
- Increase emphasis on employer policies related to driving at legal and safe speeds
- Install dynamic speed feedback signs at rural/urban transitions, school zones and work zones
- Incorporate curbs, sidewalks, lighting and other design elements to indicate lower speeds in transition areas

Collaboration will make it possible

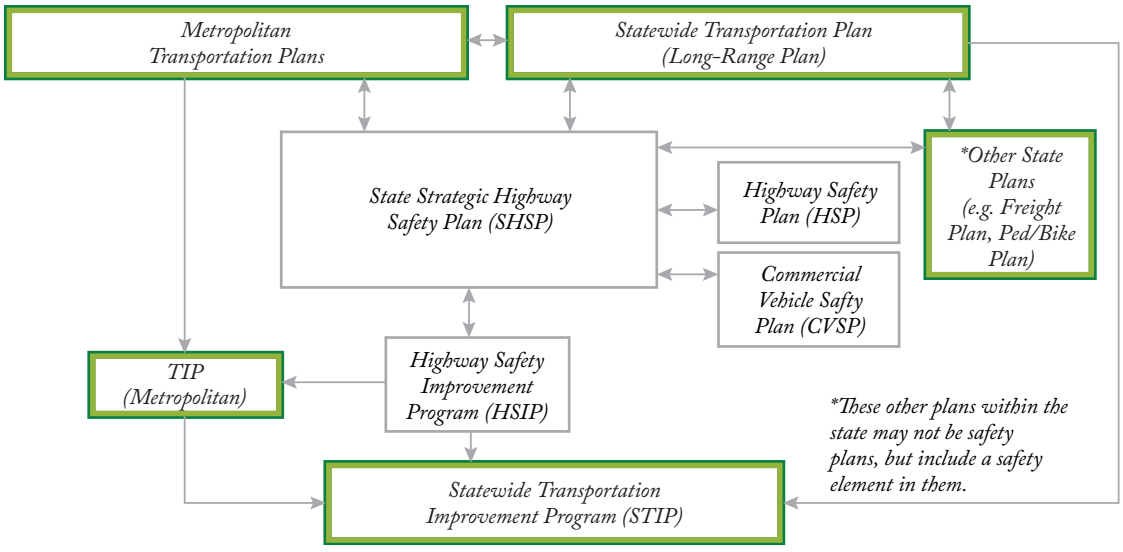
Collaboration has been a key factor in Minnesota's success with reducing traffic fatalities. The TZD program was created on a foundation of partnership and collaboration that has grown stronger each year. Combining the efforts of education, emergency medical services, enforcement and engineering professionals has significantly improved traffic safety during the past 10 years; so much so that traffic fatalities reached their lowest point in decades in 2011 when 368 people died. Reaching fewer than 400 traffic fatalities in one year is a notable accomplishment but work must continue and future safety efforts will require effort from everyone. Hard work, determination and collaboration will make it possible for Minnesota to reach its ultimate goal of zero deaths.

Minnesota's 2007 SHSP identified the need to focus safety efforts on local roads and streets, where most traffic fatalities in Minnesota occur. Counties own and operate rural highways—where the traffic fatality problem was greatest. Recognizing that further reductions in fatal and serious injury crashes would require greater collaboration, a statewide initiative to develop local road safety plans began in 2009. The process used to develop each local plan involved crash analyses and system-wide risk assessments. That information was then used by state and local engineers to identify more than 17,000 traffic safety projects that could be deployed at the cost of $256 million. By 2013, this process had been completed in each of Minnesota's 87 counties. The local road safety plans provide a risk assessment and list of recommended, low-cost strategies for specific at-risk roads. These plans were collaboratively and systemically developed by state and local engineering, and they will be used in conjunction with the SHSP to guide local

The TZD partnership and spirit of collaboration have grown stronger each year.

Local road safety plans provide low-cost strategies for at-risk roads.

Figure 8: Coordinated Transportation Safety Planning (Cambridge Systematics, Inc., 2013)



safety investments through the Highway Safety Improvement Program.

A deeper level of collaboration is now being sought – coordination among the SHSP and broader planning efforts. There are numerous federally mandated plans that govern transportation alone and many of them address safety as a key issue. Just as focus areas are interconnected, so too should be any plans addressing traffic safety. Successful collaboration at this level will maximize the investment of resources, the effectiveness of safety strategies and the progress toward zero deaths.

Several investment and additional policy plans were reviewed during the development of this SHSP. They were reviewed for references to safety strategies, performance measures and partnering opportunities. A brief description of each plan is provided in this section to support cross-referencing among the plans, continued coordination as plans are updated, and collaboration in selecting safety strategies. The applicable traffic safety strategies identified in these individual plans are listed in Appendix C.

Collaboration will maximize the investment of resources, the effectiveness of safety strategies and the progress toward zero deaths.

Minnesota GO (2011)

Minnesota GO presents a 50-year vision describing the desired future for transportation in Minnesota. It answers the question, "What are we trying to achieve?" but not, "How will we do it?" The vision document serves as a fundamental reference for transportation policy and planning. The document was finalized in 2011 and there is currently no planned update or specified update cycle.

Minnesota Department of Transportation, Office of Transportation System Management
www.mndot.gov/minnesotago/vision.html

Statewide Multimodal Transportation Plan (2012)

The Statewide Multimodal Transportation Plan is a 20-year policy planning document for all modes of transportation in the state. It is the next step from the vision, identifying high-level policy strategies that set the framework for how Minnesota will achieve the goals laid out in the vision. Subsequent modal plans should use policy strategies in the SMTP to guide the development of modal-specific policies and investment directions. The most recent SMTP was adopted in 2012 and is required to be updated every four years.

Minnesota Department of Transportation, Office of Transportation System Management
www.mndot.gov/minnesotago/SMTP.html

Minnesota State Highway Investment Plan (2013)

The Minnesota 20-Year State Highway Investment Plan is the Minnesota Department of Transportation vehicle for communicating capital investment priorities for the next 20 years. MnSHIP is a fiscally constrained plan and is updated every four years to respond to changing conditions and assumptions. The plan details how the department will use available resources efficiently and effectively in addressing its objectives.

Minnesota Department of Transportation, Office of Transportation System Management
www.mndot.gov/planning/mnship/pdf/mnship-full-doc.pdf

Highway Safety Plan (2013)

The Highway Safety Plan addresses behavioral traffic safety issues on Minnesota roads and is revised annually. This document describes how Minnesota will use federal funding to identify and address behavioral traffic safety trends and problems. It includes a description of the project selection process in the Department of Public Safety, Office of Traffic Safety and an overview of each traffic safety issue along with performance measures and research-based projects to address each problem area.

Minnesota Department of Public Safety, Office of Traffic Safety
https://dps.mn.gov/divisions/ots/educational-materials/Documents/HSP-Original-New.pdf

Minnesota State Patrol Strategic Plan (2013)

This is a strategic plan for the Minnesota State Patrol that is updated biannually. This document is used to inform the State Patrol hiring process, promotional process, training curriculum, and day-to-day activities of employees. The plan serves as a road map to the future for the agency, and ensures that activities undertaken are done so in a strategic manner, while also achieving the agency's overarching goals.

Minnesota Department of Public Safety, Minnesota State Patrol
https://dps.mn.gov/divisions/msp/about/Documents/2013-2016%20Strategic%20Plan.pdf

Minnesota Trauma System Performance Improvement Plan (2009)

This is the comprehensive, statewide performance improvement plan to assist Minnesota in its efforts to evaluate and improve the effectiveness of trauma care throughout the state. The purpose of the plan is to provide emergency medical services agencies, trauma centers, trauma regions and the state trauma program with a summary of the processes and activities required to measure, monitor, evaluate and improve trauma care and its outcome.

Minnesota Department of Health, Office of Rural Health and Primary Care, 651-201-3566
www.health.state.mn.us/traumasystem/pi/model_pi_plan.pdf

Minnesota Trauma System Report (2012)

This is the annual report on Minnesota's voluntary trauma system, including comparative demographic and risk-adjusted epidemiological data on designated trauma hospitals.

Minnesota Department of Health, Office of Rural Health and Primary Care, 651-201-3566
www.health.state.mn.us/traumasystem/pubs/2012/annrptfy11.pdf

Minnesota Comprehensive Statewide Freight and Passenger Rail Plan (2010)

The purpose of the Minnesota Comprehensive Statewide Freight and Passenger Rail Plan is to guide the future of the rail system and rail services in the state. The plan has a 20-year horizon and will likely be updated again in 2014.

Minnesota Department of Transportation, Office of Freight and Commercial Vehicle Operations and Office of Passenger Rail
www.mndot.gov/planning/railplan/finalreport/MNRailPlanFinalReportFeb2010.pdf

Commercial Vehicle Safety Plan (2012)

This is a performance-based annual plan that outlines Minnesota's commercial motor vehicle safety objectives, strategies, activities and performance measures. The plan aims to improve motor carrier, commercial motor vehicle safety and driver safety and to reduce the number and severity of crashes involving commercial vehicles (e.g., motor coach/bus, semi-truck, trailer).

Minnesota Department of Transportation, Office of Freight and Commercial Vehicle Operations Report is not available online but may be requested from the Office of Freight and Commercial Vehicle Operations www.dot.state.mn.us/cvo/contact.html

State Bike Plan (2005)

The plan prioritizes and guides investments in safe bicycle and pedestrian accommodations on MnDOT-owned and influenced facilities. The plan provides a review of state and federal laws, policies and guidance related to bicycle transportation. It describes the role of bicycles in Minnesota's transportation system and it identifies trends, mode share and future growth potential. The plan also reviews the safety, societal and environmental challenges relevant to biking and walking. This plan is in the process of being updated and is expected to be complete in late 2014.

Minnesota Department of Transportation, Office of Transit
www.mndot.gov/bike/pdfs/modalplan.pdf

Minnesota Statewide Regional Intelligent Transportation Systems Architecture (2009, 2014)

The Intelligent Transportation Systems architecture represents a shared vision of how each agency's systems work together by sharing information and resources to enhance transportation safety, efficiency, capacity, mobility and security. It illustrates various integration options and creates a foundation for developing consensus on ITS technologies and systems prior to investing in design, development and deployment. Volume 9 Implementation Projects serves as long-range guidance to help stakeholders systematically and cost-effectively implement the ITS projects in Minnesota for the next 15-20 years based on funding availability. It defines specific ITS needs that are further refined and prioritized into prospective ITS projects.

Minnesota Department of Transportation, Office of Traffic, Safety and Technology
www.mndot.gov/guidestar/2006_2010/its_planning_and_regional_architecture.html

County Road Safety Plans (2009-13)

These are localized safety plans that identify the focus area challenges on the county highway system. The primary focus is to encourage proactive and systemic deployment of low-cost strategies to address the high frequency of fatal and serious injury crashes on rural roadways despite low crash density. The plans designate at-risk locations and suggest projects with the relevant data necessary to better position the county to compete for available safety funding. Although the plans primarily focus on proven effective, infrastructure strategies, resources and information on how to address driver behavior through education, enforcement and collaboration are also provided.

Minnesota Department of Transportation, Office of State Aid
www.mndot.gov/stateaid/county-roadway-safety-plans.html

Metropolitan Transportation Plans

Metropolitan Planning Organizations are entities designated by law with the lead responsibility for the development of a metropolitan area's transportation plans and to coordinate the transportation planning process. All urban areas over 50,000 in population are required to have an MPO if the agencies spend federal funds on transportation improvements. There are eight MPOs in Minnesota.

Grand Forks-East Grand Forks: www.theforksmpo.org/Pages/2035LongRangeTranspPlan.htm
Duluth-Superior: www.dsmic.org/Default.asp?PageID=191
Fargo-Moorhead: http://fmmetrocog.org/new/assets/documents/LRTP/FINAL%20document%20from%20PRINTER.pdf
St. Cloud: www.stcloudapo.org/uploads/1/2/8/7/12874227/lrtp-2035.pdf
Twin Cities: www.metrocouncil.org/Transportation/Planning/2030-Transportation-Policy-Plan.aspx
Rochester: www.co.olmsted.mn.us/planning/rocog/lrtp/Pages/default.aspx
La Crosse-La Crescent: www.lapc.org/Content/Plans/MTP%202010/MTP.htm
Mankato: www.mataps.com/review.html

Charting progress toward zero

The collaborative efforts of Minnesota's TZD program have moved the state closer to its ultimate traffic safety goal of zero deaths. Safety professionals and communities throughout the state are committed to the elimination of roadway fatalities as demonstrated in their longstanding support of the TZD program. The implications of zero traffic deaths are so profound that the goal is one pursued by many other countries, states, the federal government and industry associations.

Charting progress toward zero deaths is almost as important as the goal itself. The Federal Highway Administration requires that each SHSP include time-specific, traffic safety targets for fatalities and serious injuries. These are milestones that establish a measurable path toward the traffic fatality goal and mark success along the way. These targets keep the ultimate goal of zero traffic fatalities in perspective and help everyone see the results of their ongoing commitment to traffic safety. The fatality and serious injury targets for 2020 were established using a variety of projections based on 2004-12 crash data. Detailed information about the projections is provided in Appendix A.

Performance measures are the metrics used to assess progress toward specific targets, such as those established for 2020. The current federal legislation on surface transportation, Moving Ahead for Progress in the 21st Century (MAP-21), specifies four safety performance measures that all states must monitor: fatalities, serious injuries, fatalities per 100 million vehicle miles traveled, and serious injuries per 100 million vehicle miles traveled. This collective information from all states will reflect America's progress toward the national goal to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. Minnesota also chooses to monitor fatal crashes and serious injury crashes as additional performance measures. Each of these measures is applied annually to total crashes in a given year.

Tracking indicators also are used to further monitor progress toward the targets within individual focus areas. These tracking indicators are used to identify trends or areas of success and challenge. Some indicators may consist of specific projects or efforts that need to be completed as a meaningful sign of progress. For example, implementation of a single crash database is essential for addressing deficiencies in Minnesota's crash reporting. These indicators allow for more incremental and targeted course corrections within focus areas.

Most of the performance measures and tracking indicators in this plan are currently reported on an annual basis in the Minnesota Motor Vehicle Crash Facts, Highway Safety Plan, Trauma System Report, Highway Safety Improvement Program Report, and Minnesota Transportation Performance Report. The collective progress illustrated by these performance measures and tracking indicators will be used by traffic safety partners to

Minnesota's Traffic Safety Goal

Zero deaths

Minnesota's 2020 Targets for Fatalities and Serious Injuries

Fewer than
300 fatalities by 2020

Fewer than
850 serious injuries by 2020

Table 3: Minnesota's Traffic Safety Tracking Indicators by Focus Area

Tracking Indicators	Traffic Safety Culture and Awareness	Intersections	Lane Departure	Unbelted	Impaired Roadway Users	Inattentive Drivers	Speed	Older Drivers	Younger Drivers	Motorcyclists	Pedestrians	EMS and Trauma Systems	Data Management	Management Systems	Bicyclists	Commercial Vehicles	Trains	Work Zones	Unlicensed Drivers	Vehicle Safety Enhancements
Number and percentage of fatalities		X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	
Number and percentage of serious injuries		X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	
Biennially measure Minnesota's traffic safety culture using the "Minnesota Traffic Safety Survey" [1]	X																			
Number of coordinated paid media buys aimed to improve traffic safety [2]	X																			
Number and percentage of designated trauma centers [3]												X								
Annual motor vehicle case fatality rate [4]												X								
Response times for motor vehicle crashes												X								
Number of partnerships within each TZD region														X						
Develop inventory of roadway features and traffic control devices to support safety analyses and planning														X						
Percent of counties with systematic safety plans for local roadways														X						
Percent of MnDOT districts with systematic safety plans for state roadways														X						
Implement singular crash database by 2016														X						
List of road data projects aimed at data quality improvement													X							
Percent of crash reports submitted electronically													X							
Accessibility of road data, crash data and linked data for professional use													X							
Develop crash data query tool for public use													X							
Track new vehicle safety enhancements and impact on infrastructure and policy																				X
Track type of new vehicle safety enhancements and proportion of fleet with them																				X
Develop roadway asset management systems that will support emerging technologies and connectivity																				X
Number of traffic fatalities and serious injuries per capita for drivers and pedestrians over the age of 65								X			X									
Number of roadway miles designated as high risk rural road		X	X																	

1. Initial survey is being conducted in 2014 to establish a baseline for Minnesota's traffic safety culture
2. Encompasses all organizations that promote traffic safety through public service announcements and paid media across multiple focus areas
3. Trauma hospitals in Minnesota are designated as Level I, II, III or IV with designations based on the availability of resources needed to resuscitate and care for an injured patient
4. Case fatality rate is the proportion of deaths within a designated population of "cases" over the course of the disease

Minnesota's Annual Performance Measures for Crashes

Number of
fatalities

Number of
serious injuries

Number of
fatalities per 100 million vehicle miles traveled

Number of
serious injuries per 100 million vehicle miles traveled

refine strategies and dynamically plan investments in Minnesota's future traffic safety efforts. Performance measures will be used more often by all safety partners. For example, agencies may ask safety grant recipients to adjust their work based on trends or safety partners working in specific focus areas may use tracking indicators to adjust their efforts.

Establishing targets and charting progress toward them will help everyone understand how close Minnesota is to achieving its goal of zero deaths. Monitoring progress is the final part of the overall framework established by the SHSP. That framework includes the crash data, trends and stakeholder perspectives that identify current and future traffic safety issues. It establishes priorities among the traffic safety focus areas, while being inclusive of all the focus areas that may impact safety during the next several years. The framework presented in this plan also emphasizes the importance of collaboration in the planning, selection, implementation and evaluation of the traffic safety strategies. Collaboration has been and will remain essential to the continued success of moving toward zero deaths in Minnesota.

Targets help everyone track Minnesota's progress toward the goal of zero deaths.

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Appendix A: Focus area fact sheets

In addition to the crash data presented in Appendix A, a series of fact sheets are included in this appendix to provide additional data and observations for the focus areas that directly relate to fatal and serious injury crashes. Fatal and serious injury crashes are also collectively referred to as severe crashes throughout the fact sheets.

Crash data from 2008-2012 were analyzed and used to form the basis of the information presented in each fact sheet. Each fact sheet presents statewide crash statistics, relationships to road parameters, crash trends, interactions with other focus areas, crash victim demographics and time of day/year factors. This information may be used to better understand where, when and who may be involved in different types of crashes.

Fact sheets are provided for the following focus areas:

- Intersection
- Lane departure
- Unbelted occupants
- Impaired roadway users
- Inattentive drivers
- Speed
- Older drivers
- Younger drivers
- Motorcyclists
- Pedestrians
- Bicyclists
- Commercial vehicles
- Trains
- Work zones
- Unlicensed drivers

Fatal and Serious Injury Crashes:

Intersections

Fatal and serious injury crashes
2,945 Severe Crashes
589 severe crashes per year
41.9% of all severe crashes

Crashes of all severities
166,751 crashes
33,350 crashes per year
46.1% of all crashes

On Minnesota roadways, there were 2,945 severe intersection crashes between 2008 and 2012. This is an average of 589 severe crashes per year and accounted for 42% of all severe crashes during the five-year period.

Statewide Crash Statistics

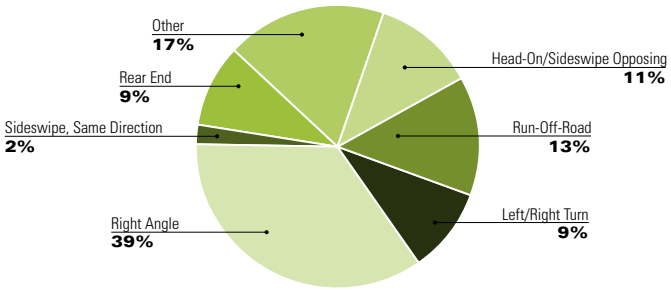
Jurisdiction and area type distribution of severe crashes involving intersections

	Rural		Urban		Other		Statewide	
State Trunk Highways	533	18%	500	17%	13	<1%	1046	36%
County Roads	503	17%	689	23%	21	1%	1213	41%
City	34	1%	564	19%	17	1%	615	21%
Township	55	2%	2	<1%	11	<1%	68	2%
Other	1	<1%	1	<1%	1	<1%	3	<1%
All Jurisdictions	1126	38%	1756	60%	63	2%	2945	100%

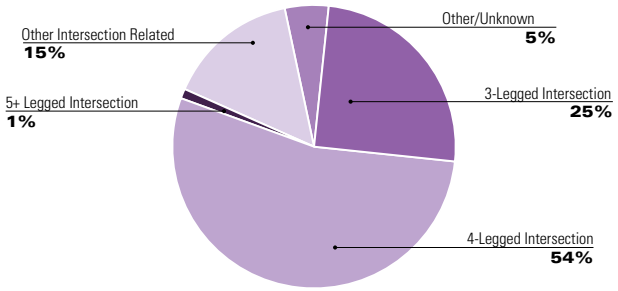
Severe intersection crashes primarily occur in urban areas (1756 of 2945; 60%).

64% of these crashes occurred on local roadway systems.

Crash diagram distribution



Intersection relation distribution



Relationship to Road Parameters

Road design type and speed limit distribution of severe crashes involving intersections in **rural** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	3	<1%	0	0%	16	1%	19	1%
Other Divided Highway	1	<1%	3	<1%	1	<1%	139	5%	144	5%
4-6 Lanes	0	0%	3	<1%	2	<1%	25	1%	30	1%
3-Lane and 5-Lane	0	0%	1	0%	1	<1%	16	1%	18	1%
2-Lane Roadway	4	<1%	88	3%	23	1%	763	26%	878	30%
One-Way Street	0	0%	1	<1%	0	0%	0	0%	1	<1%
Other	1	<1%	7	<1%	0	0%	28	1%	36	1%
All Roadways	6	<1%	106	4%	27	1%	987	34%	1126	38%

Road design type and speed limit distribution of severe crashes involving intersections in **urban** areas

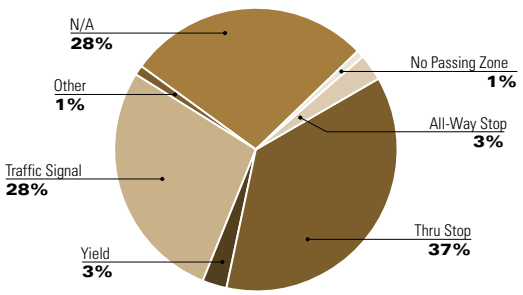
	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	1	<1%	10	<1%	9	<1%	95	3%	115	4%
Other Divided Highway	0	0%	48	2%	82	3%	240	8%	370	13%
4-6 Lanes	2	<1%	245	8%	147	5%	150	5%	544	18%
3-Lane and 5-Lane	0	0%	11	<1%	17	1%	10	<1%	38	1%
2-Lane Roadway	11	<1%	326	11%	62	2%	128	4%	527	18%
One-Way Street	1	<1%	74	3%	4	<1%	2	<1%	81	3%
Other	8	<1%	36	1%	17	1%	20	1%	81	3%
All Roadways	23	1%	750	25%	338	11%	645	22%	1756	60%

In urban areas, severe urban intersection crashes in 30 mph speed limit zones occurred predominantly at 4-6 lane (245 of 750; 33%) and 2-lane (326 of 750; 43%) roadway intersections.

In urban areas, severe urban intersection crashes in speed limit zones ≥45 mph occurred predominantly at divided highway (240 of 645; 37%) roadway intersections.

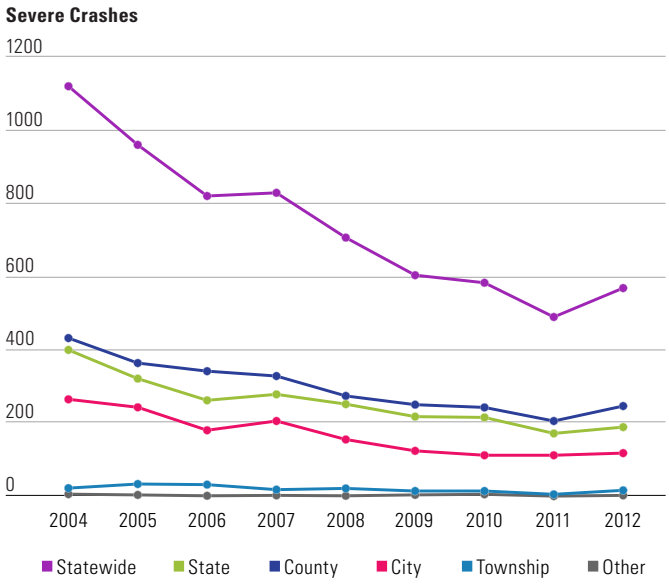
68% (763 of 1126) of severe intersection crashes in rural areas occurred on two-lane roadways with high speed limits (≥45 mph).

Traffic control device distribution

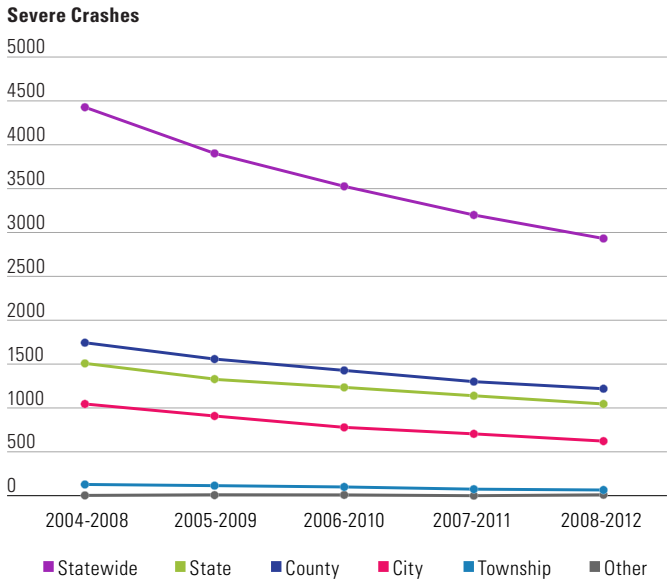


Trends

Severe crashes involving intersections



Five year rolling total of severe crashes involving intersections



Focus Areas

Interaction with other safety focus areas

Bicyclist (6.5% of severe intersection crashes) and pedestrian (11.1% of severe intersection crashes) are proportionally overrepresented focus areas.

Older, younger, and inattentive drivers are also somewhat overrepresented in severe intersection crashes.

Focus Area	Severe Crashes at Intersections	Percentage of Intersection Crashes	Percentage of All Severe Crashes	Difference
Older	541	18.4%	14.6%	+3.8% —
Bicyclist	191	6.5%	4.1%	+2.4% —
Commercial Vehicle	359	12.2%	10.1%	+2.0% —
Pedestrian	328	11.1%	9.2%	+1.9% —
Inattentive	607	20.6%	18.7%	+1.9% —
Younger	600	20.4%	19.4%	+0.9% —
Motorcycle	522	17.7%	17.7%	-0.0% —
Unlicensed	272	9.2%	10.0%	-0.7% —
Unbelted	945	32.1%	35.0%	-2.9% —
Speeding	420	14.3%	18.6%	-4.3% —
Impaired	594	20.2%	26.3%	-6.1% ↓
Lane Departure	691	23.5%	45.5%	-22.0% ↓

Demographics

Age and sex of drivers involved

Drivers of all ages are represented notably in severe intersection crashes.

65% of drivers involved in severe intersection crashes are male.

Age	Male		Female		Other/Unknown		All Intersection Users	
<21	372	7%	271	5%	1	<1%	644	13%
21 to 25	384	8%	186	4%	2	<1%	572	11%
26 to 35	571	11%	304	6%	0	0	875	17%
36 to 45	569	11%	265	5%	0	0	834	16%
46 to 55	596	12%	267	5%	0	0	863	17%
56 to 65	468	9%	200	4%	1	<1%	669	13%
>65	345	7%	211	4%	1	<1%	557	11%
Unknown	9	<1%	1	<1%	58	1%	68	1%
Total	3314	65%	1705	34%	63	1%	5082	100%

When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	11	5	14	20	17	22	19	14	17	26	11	10	186	6%
3:00 AM to 5:59 AM	2	7	11	11	6	11	10	12	5	16	6	7	104	4%
6:00 AM to 8:59 AM	25	23	28	23	28	20	25	30	37	39	26	24	328	11%
9:00 AM to 11:59 AM	26	24	21	24	33	30	40	38	33	35	38	24	366	13%
Noon to 2:59 PM	42	46	42	61	82	81	99	84	96	53	58	48	792	27%
3:00 PM to 5:59 PM	26	37	29	45	69	65	75	62	72	57	41	48	626	21%
6:00 PM to 8:59 PM	8	15	18	12	16	23	44	24	26	29	21	12	248	8%
9:00 PM to Midnight	11	18	17	21	31	28	51	31	25	18	13	10	274	9%
Total	151	175	180	217	282	280	363	295	311	273	214	183	2924	100%
	5%	6%	6%	7%	10%	10%	12%	10%	11%	9%	7%	6%		

40% of severe intersection crashes occurred between morning and evening rush hours (9:00 AM to 3:00 PM).

*While there were a total of 2,945 severe intersection crashes, the time of crash was unknown for 21. Therefore, the total reflected in this table is 2,924.

Light conditions

Light Condition	Severe Crashes at Intersections	Percentage	All Severe Crashes
Daylight	2022	69%	61%
Sunrise	59	2%	3%
Sunset	63	2%	3%
Night/Dark	790	27%	33%
Street Lights On	535	18%	14%
Street Lights Off	12	<1%	1%
No Street Lights	229	8%	17%
Unknown Lighting	14	<1%	1%
Other/Unknown	11	<1%	1%

More severe intersection crashes than all severe crashes occur in daylight.

Road surface conditions

Road Surface Condition	Severe Crashes at Intersectons	Percentage	All Severe Crashes
Dry	2410	82%	78%
Wet	315	11%	9%
Snow/Slush/Ice	186	6%	11%
Mud/Debris	9	<1%	<1%
Other	25	1%	2%

Severe intersection crashes are slightly more likely to occur on wet pavement when compared to all severe crashes.

Fatal and Serious Injury Crashes:

Lane Departure

Fatal and serious injury crashes
3,199 severe crashes
640 severe crashes per year
45.5% of all severe crashes

Crashes of all severities
86,902 crashes
17,380 crashes per year
24.0% of all crashes

On Minnesota roadways, there were 3,199 severe lane departure crashes (including run-off-road, head-on, and sideswipe opposing crashes) between 2008 and 2012. This is an average of 640 severe crashes per year and accounted for 45.5% of all severe crashes during the five-year period.

Statewide Crash Statistics

Jurisdiction and area type distribution of severe crashes involving lane departure

	Rural		Urban		Other		Statewide	
State Trunk Highways	859	27%	337	11%	18	1%	1214	38%
County Roads	1011	32%	350	11%	42	1%	1403	44%
City	33	1%	335	10%	15	<1%	383	12%
Township	159	5%	3	<1%	24	1%	186	6%
Other	5	<1%	0	0%	8	<1%	13	<1%
All Jurisdictions	2067	65%	1025	32%	107	3%	3199	100%

Severe lane departure crashes primarily occur in rural areas (2067 of 3199; 65%).

These crashes occur primarily on two roadway jurisdictions: County (1403 of 3199; 44%) and State (1214 of 3199; 38%).

Proportion of severe lane departure crashes along curves by jurisdiction and area type

	Rural		Urban		Other		Statewide	
State Trunk Highways	284 of 859	33%	107 of 337	32%	5 of 18	28%	396 of 1214	33%
County Roads	**465 of 1011**	**46%**	93 of 350	27%	13 of 42	31%	571 of 1403	41%
City	11 of 33	33%	100 of 335	30%	3 of 15	20%	114 of 383	30%
Township	45 of 159	28%	2 of 3	67%	10 of 24	42%	57 of 186	31%
Other	4 of 5	80%	0 of 0	0%	4 of 8	50%	8 of 13	62%
All Jurisdictions	809 of 2067	39%	302 of 1025	29%	35 of 107	33%	1146 of 3199	36%

36% of all severe lane departure crashes occur along a curve.

46% of severe lane departure crashes on rural county roads occur along a curve, compared to only 33% of those on rural state trunk highways.

Relationship to Road Parameters

Road design type and speed limit distribution of severe lane departure crashes in **rural** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	2	<1%	0	0%	128	4%	130	4%
Other Divided Highway	0	0%	2	<1%	0	0%	117	4%	119	4%
4-6 Lanes	0	0%	2	<1%	0	0%	15	<1%	17	1%
3-Lane and 5-Lane	0	0%	0	0%	0	0%	7	<1%	7	<1%
2-Lane Roadway	10	<1%	86	3%	35	1%	**1563**	**49%**	1694	53%
One-Way Street	0	0%	1	<1%	0	0%	0	0%	1	<1%
Other	5	<1%	7	<1%	2	<1%	85	3%	99	3%
All Roadways	15	<1%	100	3%	37	1%	1915	60%	2067	65%

65% of Minnesota's severe lane departure crashes occur in rural areas, compared to 32% in urban areas.

2-lane roads with high speed limits (45+ mph) in rural areas account for 49% of severe lane departure crashes; alternatively, 76% (1563 of 2067) of severe lane departure crashes in rural areas occur on 2-lane roadways with high speed limits.

Road design type and speed limit distribution of severe lane departure crashes in urban areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	7	<1%	6	<1%	150	5%	163	5%
Other Divided Highway	0	0%	6	<1%	24	1%	95	3%	125	4%
4-6 Lanes	0	0%	80	3%	59	2%	49	2%	188	6%
3-Lane and 5-Lane	0	0%	6	<1%	11	<1%	6	<1%	23	1%
2-Lane Roadway	9	<1%	239	7%	64	2%	155	5%	467	14%
One-Way Street	1	<1%	19	1%	1	<1%	1	<1%	22	1%
Other	7	<1%	10	<1%	5	<1%	15	<1%	37	1%
All Roadways	17	1%	367	11%	170	5%	471	15%	1025	32%

The severe lane departure crashes that occur in urban areas are more distributed among both facility type and speed limit than those in rural areas.

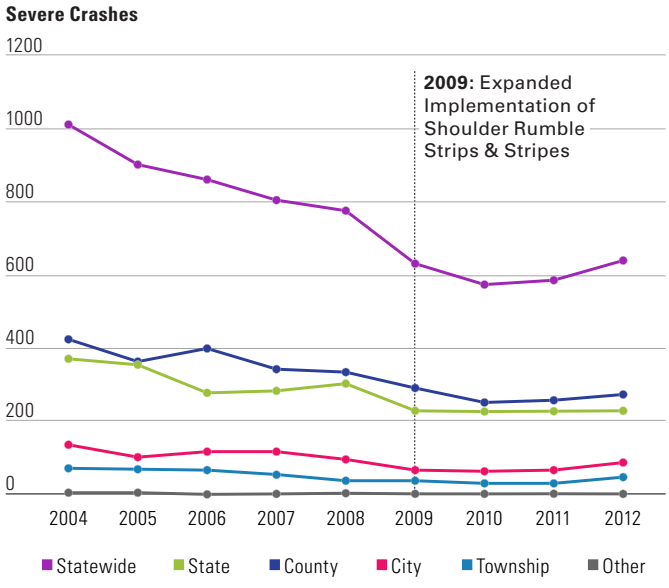
Most commonly reported harmful event

Harmful Event	Severe Lane Departure Crashes	Percentage	All Severe Crashes
Overturn/Rollover	885	28%	16%
Collision with vehicle	799	25%	43%
Tree/Shrubbery	401	13%	7%
Embankment/Ditch/Curb	310	10%	5%
Pedestrian/Cyclist	191	6%	13%
Pole/Utility	169	5%	3%
Bridge/Guardrail	146	5%	2%
Other	130	4%	5%
Other Fixed Objects	107	3%	3%
Deer/Animal	61	2%	2%

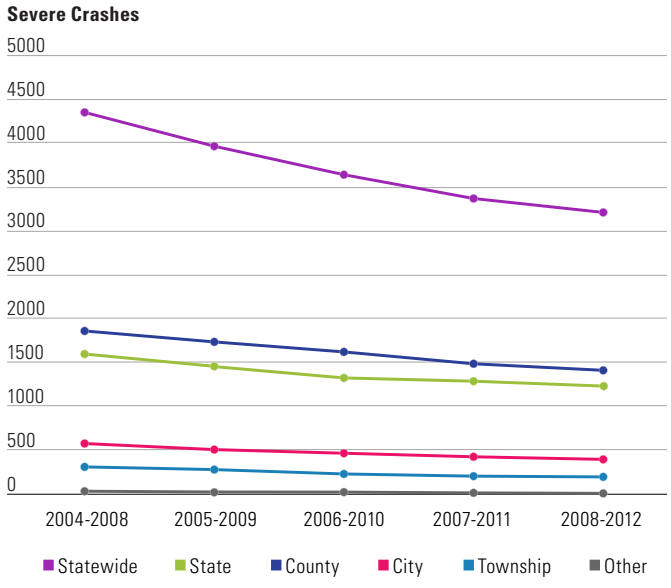
The top three most harmful events for a severe lane departure crash are overturning (28%), colliding with another vehicle (25%) and hitting a tree or shrubbery (13%).

Trends

Severe crashes involving lane departures



Five year rolling total of severe crashes involving lane departures



Focus Areas

Interaction with other safety focus areas

37% of severe lane departure crash reports indicate alcohol as a factor. However, for all severe crashes statewide, only 26% of crashes involved alcohol.

Overrepresented focus areas also include unbelted occupants and speeding drivers, represented in 45% and 25% of severe lane departure crashes, respectively.

Focus Area	Severe Lane Departure Crashes	Percentage of Lane Departure Crashes	Percentage of All Severe Crashes	Difference
Impaired	1183	37.0%	26.3%	+10.7% ↑
Unbelted	1423	44.5%	35.0%	+9.5% ↑
Speeding	814	25.4%	18.6%	+6.8% ↑
Unlicensed	382	11.9%	10.0%	+2.0% —
Younger	596	18.6%	19.4%	-0.8% —
Motorcycle	481	15.0%	17.7%	-2.6% —
Inattentive	512	16.0%	18.7%	-2.7% —
Older	376	11.8%	14.6%	-2.9% —
Bicyclist	34	1.1%	4.1%	-3.0% —
Commercial Vehicle	218	6.8%	10.1%	-3.3% —
Pedestrian	159	5.0%	9.2%	-4.3% —
Intersection	691	21.6%	41.9%	-20.3% ↓

Demographics

Age and sex of drivers involved

70% of drivers involved in lane departure crashes are male.

29% of drivers involved in lane departure crashes are younger than 26, although all age ranges are notably represented in this crash type.

Age	Male		Female		Other/Unknown		All Lane Departure Drivers	
<21	391	9%	227	5%	1	<1%	619	15%
21 to 25	440	11%	146	4%	1	<1%	587	14%
26 to 35	548	13%	204	5%	1	<1%	753	18%
36 to 45	458	11%	194	5%	0	0%	652	16%
46 to 55	499	12%	168	4%	0	0%	667	16%
56 to 65	351	8%	121	3%	0	0%	472	11%
>65	242	6%	113	3%	0	0%	355	9%
Unknown	3	<1%	1	<1%	30	1%	34	1%
Total	2932	70%	1174	29%	33	1%	4139	100%

When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	31	14	29	39	36	53	48	29	33	53	29	36	430	14%
3:00 AM to 5:59 AM	5	13	14	21	21	23	24	24	25	29	25	15	239	8%
6:00 AM to 8:59 AM	35	23	37	29	24	27	34	26	25	42	34	34	370	12%
9:00 AM to 11:59 AM	27	21	21	28	29	20	31	33	19	24	36	32	321	10%
Noon to 2:59 PM	37	38	24	33	65	65	57	65	55	46	57	50	592	19%
3:00 PM to 5:59 PM	21	31	28	40	51	52	62	56	48	51	45	40	525	17%
6:00 PM to 8:59 PM	9	15	14	26	32	23	35	41	24	27	32	18	296	9%
9:00 PM to Midnight	21	26	17	37	33	37	47	55	27	38	35	23	396	12%
Total	186	181	184	253	291	300	338	329	256	310	293	248	3169	100%
	6%	6%	6%	8%	9%	9%	11%	10%	8%	10%	9%	8%		

Although representing a smaller portion of VMT, between 9:00 PM and 3:00 AM, 26% of severe lane departure crashes occur.

Summer months (May through August) account for 39% of these severe crashes.

*While there are a total of 3,199 severe lane departure crashes, the time of crash was unknown for 30. Therefore, the total reflected in this table is 3,169.

Light conditions

Light Condition	Severe Lane Departure Crashes	Percentage	All Severe Crashes
Daylight	1699	53%	61%
Sunrise	100	3%	3%
Sunset	80	3%	3%
Night/Dark	1296	41%	33%
Street Lights On	414	13%	14%
Street Lights Off	30	1%	1%
No Street Lights	819	26%	17%
Unknown Lighting	33	1%	1%
Other/Unknown	24	1%	1%

While a 53% majority of severe lane departure crashes occur in daylight, this is below the 61% of all severe crashes that occur in daylight.

41% of severe lane departure crashes occur in dark conditions, whereas only 23% of VMT in Minnesota occur at night, and only 33% of severe crashes of all crash types occur at night.

Road surface conditions

Road Surface Condition	Severe Lane Departure Crashes	Percentage	All Severe Crashes
Dry	2428	76%	78%
Wet	265	8%	9%
Snow/Slush/Ice	426	13%	11%
Mud/Debris	14	<1%	<1%
Other	66	2%	2%

Road surface conditions for severe lane departure crashes reflect those among all severe crashes.

Fatal and Serious Injury Crashes:

Unbelted Occupants

Fatal and serious injury crashes
2,463 severe crashes
493 severe crashes per year
35.0% of all severe crashes

Crashes of all severities
41,630 crashes
8,326 crashes per year
11.5% of all crashes

On Minnesota roadways, there were 2,463 severe crashes involving an unbelted or improperly belted occupant between 2008 and 2012. This is an average of 493 severe crashes per year and accounted for 35% of all severe crashes during the five-year period.

Statewide Crash Statistics

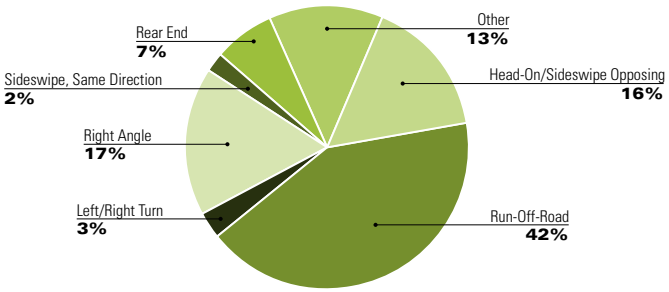
Jurisdiction and area type distribution of severe unbelted occupant crashes

	Rural		Urban		Other		Statewide	
State Trunk Highways	609	25%	286	12%	13	1%	908	37%
County Roads	719	29%	279	11%	30	1%	1028	41%
City	25	1%	316	13%	22	1%	363	15%
Township	138	6%	1	<1%	22	1%	161	7%
Other	2	<1%	0	0%	1	<1%	3	<1%
All Jurisdictions	1493	61%	882	36%	88	3%	2463	100%

Severe crashes involving unbelted or improperly belted occupants primarily occurred in rural areas (1493 of 2463; 61%).

63% of these crashes occur on local roadway systems.

Crash Diagram Distribution



Run-off-road crashes are overrepresented at 42%, compared to an average of 30% for all severe crashes.

Road design type and speed limit distribution of severe crashes involving unbelted occupants in **rural** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	2	<1%	0	0%	81	3%	83	3%
Other Divided Highway	1	<1%	3	<1%	1	<1%	118	5%	123	5%
4-6 Lanes	0	0%	1	<1%	0	0%	10	<1%	11	<1%
3-Lane and 5-Lane	0	0%	0	0%	0	0%	7	<1%	7	<1%
2-Lane Roadway	8	<1%	70	3%	22	1%	1102	45%	1202	49%
One-Way Street	0	0%	1	<1%	0	0%	0	0%		<1%
Other	4	<1%	4	<1%	1	<1%	57	2%	66	3%
All Roadways	13	1%	81	3%	24	1%	1375	56%	1493	61%

Road design type and speed limit distribution of severe crashes involving unbelted occupants in **urban** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	3	<1%	4	<1%	110	4%	117	5%
Other Divided Highway	0	0%	17	1%	30	1%	107	4%	154	6%
4-6 Lanes	1	<1%	60	2%	54	2%	48	2%	163	7%
3-Lane and 5-Lane	0	0%	5	<1%	7	<1%	4	<1%	16	1%
2-Lane Roadway	5	<1%	221	9%	33	1%	100	4%	359	15%
One-Way Street	0	0%	22	1%	2	<1%	2	<1%	26	1%
Other	5	<1%	20	1%	8	<1%	14	1%	47	2%
All Roadways	11	<1%	348	14%	138	6%	385	16%	882	36%

Severe crashes involving unbelted or improperly belted occupants are notably represented in both rural (61%) and urban (36%) areas.

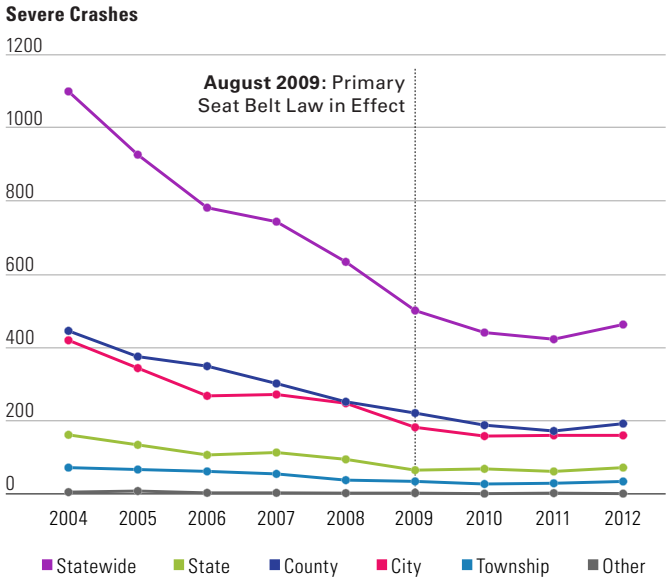
45% of this severe crash type occurs on rural two-lane roads with a high speed limit (≥ 45 mph): this means that 74% (1102 of 1493) of severe crashes involving unbelted occupants in rural areas occur on rural, high-speed two-lane roads.

25% (221 of 882) of severe crashes involving unbelted or improperly belted occupants in urban areas are on two-lane roadways with a speed limit of 30 mph.

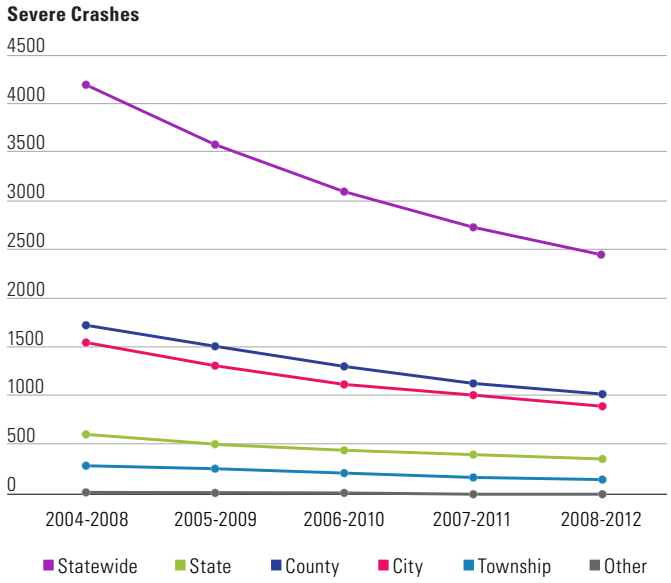
In urban areas, unbelted occupant-related severe crashes are more evenly distributed among speed limits and road design types than those in rural areas.

Trends

Severe crashes involving unbelted occupants



Five year rolling total of severe crashes involving unbelted occupants



Focus Areas

Interaction with other safety focus areas

Severe crashes involving unlicensed (16% of severe unbelted crashes), speeding (26%), and impaired (40%) drivers are overrepresented.

58% of severe unbelted crashes are a lane departure type crash, indicating a strong correlation to unbelted occupant-related severe crashes.

Focus Area	Severe Unbelted Occupant Crashes	Percentage of Unbelted Occupant Crashes	Percentage of All Severe Crashes	Difference
Impaired	977	39.7%	26.3%	+13.4% ↑
Lane Departure	1423	57.8%	45.5%	+12.3% ↑
Speeding	635	25.8%	18.6%	+7.2% ↑
Unlicensed	391	15.9%	10.0%	+5.9% ↑
Younger	572	23.2%	19.4%	+3.8% —
Commercial Vehicle	248	10.1%	10.1%	-0.1% —
Inattentive	459	18.6%	18.7%	-0.1% —
Older	301	12.2%	14.6%	-2.4% —
Bicyclist	32	1.3%	4.1%	-2.8% —
Intersection	945	38.4%	41.9%	-3.5% —
Pedestrian	97	3.9%	9.2%	-5.3% ↓
Motorcyclist	72	2.9%	17.7%	-14.8% ↓

Demographics

Age and sex of unbelted vehicle occupants

64% of unbelted or improperly belted occupants in severe crashes are male.

57% of unbelted or improperly belted occupants in severe crashes are between the ages of 15 and 35.

Age	Male		Female		Other/Unknown		All Unbelted	
<9	96	3%	121	3%	0	0%	217	6%
9 to 14	48	1%	45	1%	0	0%	93	3%
15 to 20	447	12%	300	8%	4	<1%	751	21%
21 to 25	428	12%	183	5%	4	<1%	615	17%
26 to 35	497	14%	203	6%	1	<1%	701	19%
36 to 45	256	7%	146	4%	0	0%	402	11%
46 to 55	239	7%	118	3%	0	0%	357	10%
56 to 65	161	4%	66	2%	0	0%	227	6%
>65	147	4%	73	2%	1	<1%	221	6%
Unknown	17	<1%	7	<1%	13	<1%	37	1%
Total	2336	64%	1262	35%	23	1%	3621	100%

When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	28	14	29	35	24	34	39	25	28	35	22	28	341	14%
3:00 AM to 5:59 AM	8	8	11	17	19	18	15	21	14	24	22	9	186	8%
6:00 AM to 8:59 AM	29	19	29	19	20	18	23	20	22	31	18	22	270	11%
9:00 AM to 11:59 AM	22	29	19	14	18	14	22	23	19	21	28	22	251	10%
Noon to 2:59 PM	33	24	23	38	49	51	42	53	43	35	45	40	476	19%
3:00 PM to 5:59 PM	20	32	27	33	33	28	50	29	29	39	30	26	376	15%
6:00 PM to 8:59 PM	6	20	13	16	17	11	33	26	14	21	27	13	217	9%
9:00 PM to Midnight	21	21	17	24	28	33	32	39	20	41	27	26	329	13%
Total	167	167	168	196	208	207	256	236	189	247	219	186	2446	100%
	7%	7%	7%	8%	9%	8%	10%	10%	8%	10%	9%	8%		

35% of these severe crashes occur between 9:00 PM and 6:00 AM, while only 23% of VMT in Minnesota takes place at night.

*While there are a total of 2,463 severe crashes involving unbelted or improperly belted occupants, the time of crash was unknown for 17. Therefore, the total reflected in this table is 2,446.

Light conditions

Light Conditions	Severe Unbelted Occupant Crashes	Percentage	All Severe Crashes
Daylight	1274	52%	61%
Sunrise	70	3%	3%
Sunset	70	3%	3%
Night/Dark	1031	42%	33%
Street Lights On	352	14%	14%
Street Lights Off	21	1%	1%
No Street Lights	634	26%	17%
Unknown Lighting	24	1%	1%
Other/Unknown	18	1%	1%

A larger portion of severe crashes involving unbelted occupants occur at night than that of all severe crashes.

Road surface conditions

Road Surface Conditions	Severe Unbelted Occupant Crashes	Percentage	All Severe Crashes
Dry	1866	76%	78%
Wet	243	10%	9%
Snow/Slush/Ice	294	12%	11%
Mud/Debris	11	<1%	<1%
Other	49	2%	2%

Road surface conditions are not a frequent factor reported in unbelted occupant-related severe crashes.

Fatal and Serious Injury Crashes:

Impaired Road Users

Fatal and serious injury crashes
1,850 severe crashes
370 severe crashes per year
26.3% of all severe crashes

Crashes of all severities
19,456 crashes
3,891 crashes per year
5.4% of all crashes

On Minnesota roadways, there were 1,850 severe crashes involving impaired drivers and roadway users between 2008 and 2012. This is an average of 370 severe crashes per year and accounted for 26% of all severe crashes during the five-year period.

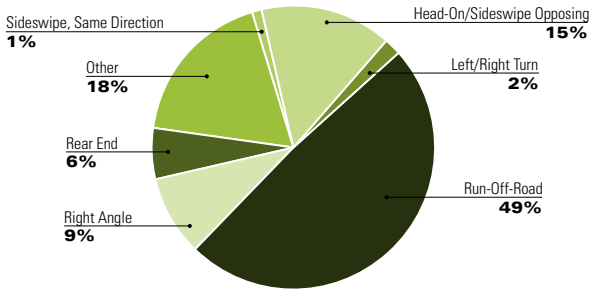
Statewide Crash Statistics

Jurisdiction and area type distribution of severe impaired road user crashes

	Rural		Urban		Other		Statewide	
State Trunk Highways	379	20%	244	13%	7	<1%	630	34%
County Roads	555	30%	221	12%	27	1%	803	43%
City	20	1%	251	14%	10	1%	281	15%
Township	108	6%	2	<1%	16	1%	126	7%
Other	2	<1%	1	<1%	7	<1%	10	1%
All Jurisdictions	1064	58%	719	39%	67	3%	1850	100%

Severe crashes involving impaired roadway users occur across all roadway jurisdictions and in both rural and urban areas. However, most severe crashes occurred on rural roads (58%; 1064 of 1850).

Crash Diagram Distribution



Run-off-road crashes are overrepresented at 49%, compared to an average of 30% for all severe crashes.

In total, lane departure accounts for 64% of all severe crashes involving impaired roadway users.

Relationship to Road Parameters

Road design type and speed limit distribution of severe crashes involving impaired users in **rural** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	1	<1%	0	0%	28	2%	29	2%
Other Divided Highway	0	0%	1	<1%	0	0%	79	4%	80	4%
4-6 Lanes	0	0%	1	<1%	0	0%	6	<1%	7	<1%
3-Lane and 5-Lane	0	0%	0	0%	1	<1%	2	<1%	3	<1%
2-Lane Roadway	17	1%	67	4%	20	1%	791	43%	895	48%
One-Way Street	0	0%	0	0%	0	0%	0	0%	0	0%
Other	11	1%	5	<1%	1	<1%	33	2%	50	3%
All Roadways	28	2%	75	4%	22	1%	939	51%	1064	58%

Road design type and speed limit distribution of severe crashes involving impaired users in **urban** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	1	<1%	8	<1%	5	<1%	92	5%	106	6%
Other Divided Highway	0	0%	11	1%	19	1%	99	5%	129	7%
4-6 Lanes	0	0%	69	4%	43	2%	39	2%	151	8%
3-Lane and 5-Lane	0	0%	4	<1%	5	<1%	3	<1%	12	1%
2-Lane Roadway	8	<1%	178	10%	32	2%	65	4%	283	15%
One-Way Street	1	<1%	14	1%	1	<1%	0	0%	16	1%
Other	5	<1%	14	1%	0	0%	3	<1%	22	1%
All Roadways	15	1%	298	16%	105	6%	301	16%	719	39%

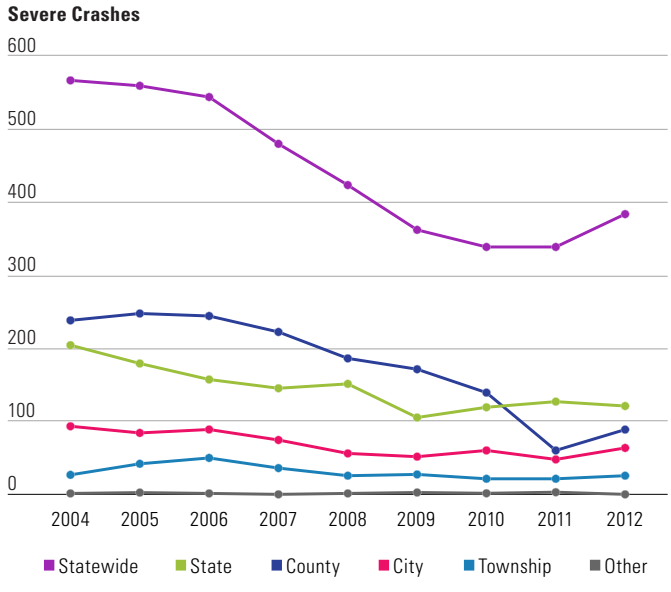
Severe crashes involving impaired users are notably represented in both rural (58%) and urban (39%) areas.

43% of this severe crash type occur on rural two-lane roads with a high speed limit (≥ 45 mph); this means that 74% (791 of 1064) of severe crashes involving impaired users in rural areas occur on rural, high-speed, two-lane roads.

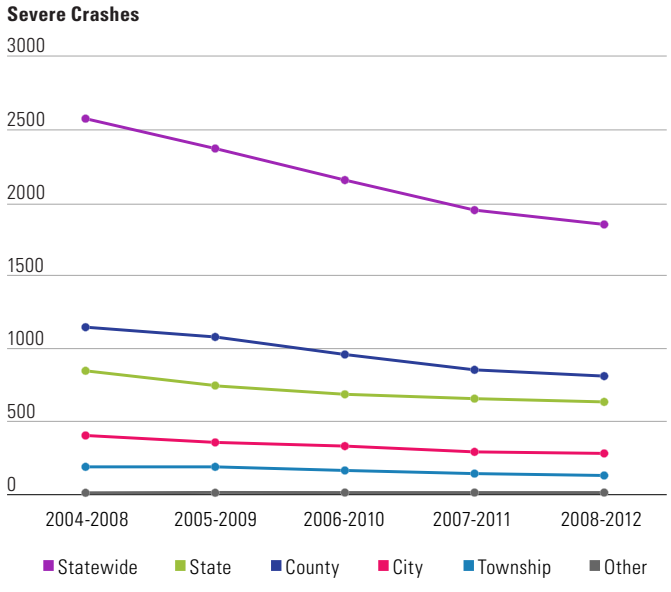
25% (178 of 719) of severe crashes involving impaired users in urban areas are on two-lane roadways with a speed limit of 30 mph.

Trends

Severe crashes involving impaired road users



Five year rolling total of severe crashes involving impaired road users



Focus Areas

Interaction with other safety focus areas

An overrepresented 64% of severe impaired user crashes were a lane departure type crash.

Unlicensed (19% of severe impaired user crashes), Speeding (32%), and Unbelted (53%) focus areas are overrepresented for this crash type.

Younger and older drivers, inattentive drivers, bicyclists, and commercial vehicle drivers are underrepresented in severe impaired user crashes.

Focus Area	Severe Crashes with Impaired Users	Severe Crashes with Impaired Users	Percentage of All Severe Crashes	Difference
Lane Departure	1183	63.9%	45.5%	+18.5% ↑
Unbelted	977	52.8%	35.0%	+17.8% ↑
Speeding	593	32.1%	18.6%	+13.4% ↑
Unlicensed	350	18.9%	10.0%	+8.9% ↑
Pedestrian	165	8.9%	9.2%	-0.3% —
Bicyclist	31	1.7%	4.1%	-2.4% —
Motorcyclist	280	15.1%	17.7%	-2.5% —
Younger	267	14.4%	19.4%	-5.0% ↓
Commercial Vehicle	72	3.9%	10.1%	-6.3% ↓
Inattentive	228	12.3%	18.7%	-6.4% ↓
Older	96	5.2%	14.6%	-9.4% ↓
Intersection	594	32.1%	41.9%	-9.7% ↓

Demographics

Age and sex of impaired roadway users

Age	Male		Female		Other/Unknown		All Impaired Users	
<21	155	8%	54	3%	1	<1%	210	11%
21 to 25	339	18%	66	3%	1	<1%	406	21%
26 to 35	385	20%	91	5%	0	0%	476	25%
26 to 45	282	15%	73	4%	0	0%	355	18%
46 to 55	236	12%	59	3%	0	0%	295	15%
56 to 65	124	6%	14	1%	0	0%	138	7%
> 65	39	2%	6	<1%	0	0%	45	2%
Unknown	2	<1%	0	0%	3	<1%	5	<1%
Total	1562	81%	363	19%	5	<**1%**	1930	100%

When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	32	15	32	41	36	56	50	42	33	53	32	36	458	25%
3:00 AM to 5:59 AM	5	6	13	15	18	19	20	19	19	25	21	10	190	10%
6:00 AM to 8:59 AM	9	6	10	9	13	6	9	9	12	10	7	4	104	6%
9:00 AM to 11:59 AM	7	1	4	6	9	4	5	6	4	6	6	4	62	3%
Noon to 2:59 PM	9	3	8	9	15	17	16	16	13	16	15	7	144	8%
3:00 PM to 5:59 PM	12	11	13	13	27	24	30	22	20	25	14	18	229	12%
6:00 PM to 8:59 PM	3	15	16	18	25	18	36	23	23	21	24	16	238	13%
9:00 PM to Midnight	20	20	19	34	42	44	59	56	30	39	25	28	416	23%
Total	97	77	115	145	185	188	225	193	154	195	144	123	1841	100%
	5%	4%	6%	8%	10%	10%	12%	10%	8%	11%	8%	7%		

48% of severe impaired user crashes occur between 9:00 PM and 3:00 AM.

42% of impaired user crashes occur in summer months (May through August).

*While there are a total of 1,850 severe crashes involving impaired roadway users, the time of crash was unknown for nine. Therefore, the total reflected in this table is 1,841.

Light conditions

Light Conditions	Severe Crashes with Impaired Users	Percentage	All Severe Crashes
Daylight	524	28%	61%
Sunrise	48	3%	3%
Sunset	52	3%	3%
Night/Dark	1199	65%	33%
Street Lights On	467	25%	14%
Street Lights Off	35	2%	1%
No Street Lights	666	36%	17%
Unknown Lighting	31	2%	1%
Other/Unknown	27	1%	1%

Severe impaired user crashes are nearly twice as likely to occur at night as the average for all severe crashes.

Road surface conditions

Road Surface Conditions	Severe Crashes with Impaired Users	Percentage	All Severe Crashes
Dry	1505	81%	78%
Wet	179	10%	9%
Snow/Slush/Ice	111	6%	11%
Mud/Debris	6	<1%	<1%
Other	49	3%	2%

Road surface conditions are unlikely a factor in most severe crashes involving impaired roadway users.

The underrepresentation of snowy road surface conditions may be related to the underrepresentation of severe impaired user crashes in winter months as seen in the time and year distribution table above.

Fatal and Serious Injury Crashes:

Inattentive Drivers

Fatal and serious injury crashes
1,319 severe crashes
264 severe crashes per year
18.7% of all severe crashes

Crashes of all severities
87,354 crashes
17,471 crashes per year
24.2% of all crashes

On Minnesota roadways, there were 1,319 severe crashes involving involving inattention/inattentive driving between 2008 and 2012. This is an average of 264 severe crashes per year and accounted for 19% of all severe crashes during the five-year period.

The majority of severe inattentive driving crashes do not occur under adverse driving conditions:

- *92% of these crashes occur during calm weather conditions (clear or cloudy).*
- *70% of these crashes occur during daylight.*
- *84% of these crashes occur on dry pavement.*
- *Intersection crash types occur predominantly on straight segments (92%), but the presence of curves nearly doubles the occurrence of lane departure crash types (36%).*

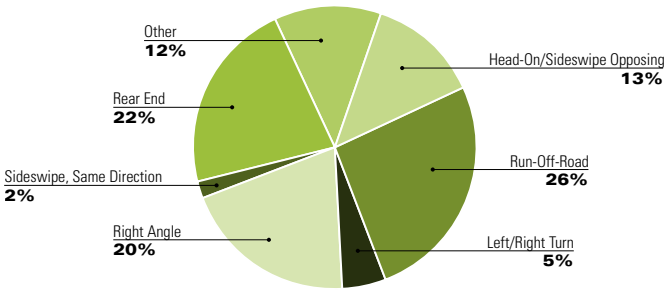
Statewide Crash Statistics

Jurisdiction and area type distribution of severe crashes involving inattentive drivers

	Rural		Urban		Other		Statewide	
State Trunk Highways	394	30%	211	16%	4	<1%	609	46%
County Roads	283	21%	219	17%	7	1%	509	39%
City	18	1%	152	12%	6	< 1%	176	13%
Township	20	2%	0	0%	4	<1%	24	2%
Other	0	0%	0	0%	1	<1%	1	<1%
All Jurisdictions	715	54%	582	44%	22	2%	1319	100%

Severe crashes involving inattentive driving have a notable presence within both state and local roadway systems, as well as in both rural and urban areas.

Crash Diagram Distribution



Severe crashes involving inattentive drivers is present among differing crash diagram types, with 49% of crashes intersection-releated, and 39% lane-departure-related.

Relationship to Road Parameters

Road design type and speed limit distribution of severe crashes involving inattentive users in **rural** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	1	<1%	0	0%	53	4%	54	4%
Other Divided Highway	1	<1%	1	<1%	1	<1%	73	6%	76	6%
4-6 Lanes	0	0%	1	<1%	2	<1%	6	<1%	9	1%
3-Lane and 5-Lane	0	0%	0	0%	0	0%	8	1%	8	1%
2-Lane Roadway	2	<1%	36	3%	12	1%	505	38%	555	42%
One-Way Street	0	0%	0	0%	0	0%	0	0%	0	0%
Other	1	<1%	0	0%	1	<1%	11	1%	13	1%
All Roadways	4	<1%	39	3%	16	1%	656	50%	715	54%

Road design type and speed limit distribution of severe crashes involving inattentive users in **urban** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	1	<1%	0	0%	86	7%	87	7%
Other Divided Highway	0	0%	13	1%	19	1%	72	5%	104	8%
4-6 Lanes	0	0%	52	4%	49	4%	35	3%	136	10%
3-Lane and 5-Lane	0	0%	4	<1%	7	1%	4	<1%	15	1%
2-Lane Roadway	3	<1%	102	8%	23	2%	69	5%	197	15%
One-Way Street	1	<1%	19	1%	3	<1%	0	0%	23	2%
Other	4	<1%	11	1%	3	<1%	2	<1%	20	2%
All Roadways	8	1%	202	15%	104	8%	268	20%	582	44%

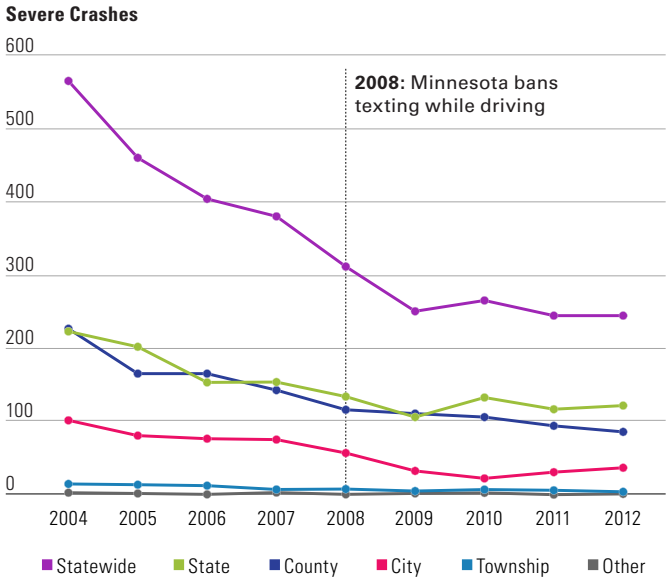
Severe crashes involving inattentive drivers are notably represented in both rural and urban areas.

38% of this severe crash type occurs on rural two-lane roads with a high speed limit (≥ 45 mph); alternatively, 71% of severe inattentive driving crashes in rural areas occur on rural two-lane roads with a high speed limit.

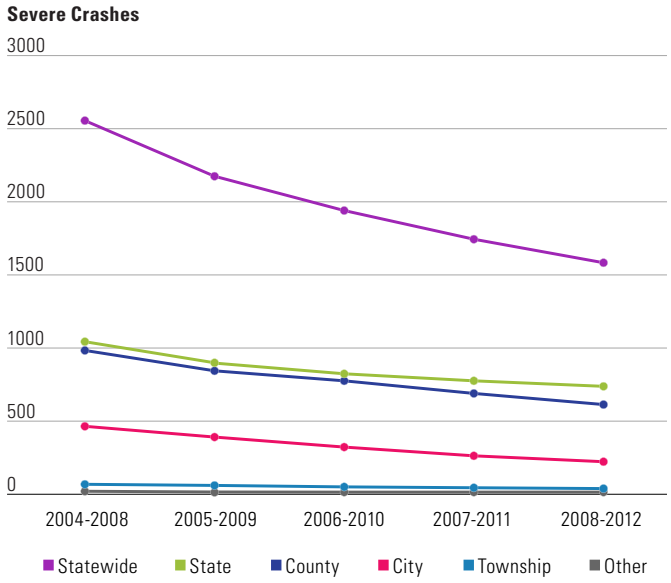
Although two-lane roadways represent the largest amount of severe inattentive driving crashes in urban areas, the crashes are distributed among all speed limits and road design types.

Trends

Severe crashes involving inattentive drivers



Five year rolling total of severe crashes involving inattentive drivers



Focus Areas

Interaction with other safety focus areas

Severe distracted driving crashes do not significantly correlate to speeding, impaired driving, or lane departure crashes.

Focus Area	Severe Crashes with Inattentive Drivers	Percentage of Crashes with Inattentive Drivers	Percentage of All Severe Crashes	Difference
Intersection	607	46.0%	41.9%	+4.2% —
Older	234	17.7%	14.6%	+3.1% —
Commercial Vehicle	175	13.3%	10.1%	+3.1% —
Younger	289	21.9%	19.4%	+2.5% —
Pedestrian	119	9.0%	9.2%	-0.2% —
Unbelted	459	34.8%	35.0%	-0.2% —
Bicyclist	41	3.1%	4.1%	-1.0% —
Unlicensed	107	8.1%	10.0%	-1.9% —
Motorcyclist	180	13.6%	17.7%	-4.0% —
Lane Departure	512	38.8%	45.5%	-6.6% ↓
Impaired	228	17.3%	26.3%	-9.0% ↓
Speeding	97	7.4%	18.6%	-11.3% ↓

Demographics

Age and sex of innatentive roadway users

64% of severe crashes in which inattentive driving is listed as a contributing factor identify male drivers as an inattentive party.

Drivers aged 25 and younger account for 33% of inattentive driving-related severe crashes.

Age	Male		Female		Other/Unknown		All Inattentive Users	
<21	150	11%	89	7%	0	0%	239	18%
21 to 25	136	10%	63	5%	1	<1%	200	15%
26 to 35	149	11%	92	7%	0	0%	241	18%
36 to 45	116	9%	69	5%	0	0%	185	14%
46 to 55	127	10%	60	4%	0	0%	187	14%
56 to 65	80	6%	41	3%	0	0%	121	9%
>65	103	7%	49	4%	0	0%	152	11%
Unknown	2	<1%	0	0%	8	1%	10	1%
Total	863	64%	463	35%	9	1%	1335	100%

When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	3	1	5	7	8	10	8	9	6	9	3	7	76	6%
3:00 AM to 5:59 AM	1	6	4	7	2	8	6	12	3	13	8	7	77	6%
6:00 AM to 8:59 AM	6	4	17	15	10	13	18	18	18	29	4	10	162	12%
9:00 AM to 11:59 AM	16	14	12	9	23	17	20	16	16	13	13	11	180	14%
Noon to 2:59 PM	14	15	13	25	42	45	50	40	46	36	25	15	366	28%
3:00 PM to 5:59 PM	8	13	12	16	22	33	40	33	22	23	16	15	253	19%
6:00 PM to 8:59 PM	4	4	5	5	6	7	10	18	8	8	9	4	88	7%
9:00 PM to Midnight	7	9	4	15	9	10	15	12	10	11	5	8	115	9%
Total	59	66	72	99	122	143	167	158	129	142	83	77	1317	100%
	4%	5%	5%	8%	9%	11%	13%	12%	10%	11%	6%	6%		

47% of severe crashes involving inattentive driving occur in the afternoon between noon and 6:00 PM.

45% of severe crashes involving inattentive driving occur in summer months (May through August).

*While there are a total of 1,319 severe crashes involving inattentive driving, the time of crash was unknown for two. Therefore, the total reflected in this table is 1,317.

Light conditions

Light Condition	Severe Crashes with Inattentive Drivers	Percentage	All Severe Crashes
Daylight	919	70%	61%
Sunrise	33	3%	3%
Sunset	17	1%	3%
Night/Dark	342	26%	33%
Street Lights On	135	10%	14%
Street Lights Off	6	0%	1%
No Street Lights	196	15%	17%
Unknown Lighting	5	<1%	<1%
Other/Unknown	8	1%	<1%

A larger portion of severe inattentive driving crashes occur under daylight conditions than that of all severe crashes.

Road surface conditions

Road Surface Condition	Severe Crashes with Inattentive Drivers	Percentage	All Severe Crashes
Dry	1109	84%	78%
Wet	132	10%	9%
Snow/Slush/Ice	63	5%	11%
Mud/Debris	2	<1%	<1%
Other	13	1%	2%

A larger portion of severe inattentive driving crashes occur on dry pavement conditions than that of all severe crashes.

Winter weather accounts for less than half of severe inattentive driving crashes than that for all severe crashes.

Fatal and Serious Injury Crashes:

Speed

Fatal and serious injury crashes
1,309 severe crashes
262 severe crashes per year
18.6% of all severe crashes

Crashes of all severities
47,838 crashes
9,568 crashes per year
13.2% of all crashes

On Minnesota roadways, there were 1,309 severe speeding-related crashes between 2008 and 2012. This is an average of 262 severe crashes per year and accounted for 19% of all severe crashes during the five-year period.

Statewide Crash Statistics

Jurisdiction and area type distribution of severe crashes involving speeding

	Rural		Urban		Other		Statewide	
State Trunk Highways	294	22%	197	15%	7	1%	498	38%
County Roads	334	26%	143	11%	16	1%	493	38%
City	24	2%	201	15%	10	1%	235	18%
Township	69	5%	0	0%	9	1%	78	6%
Other	2	<1%	0	0%	3	<1%	5	<1%
All Jurisdictions	723	55%	541	41%	45	3%	1309	100%

Severe crashes involving speeding have a notable presence within both state and local roadway systems, as well as in both rural and urban areas.

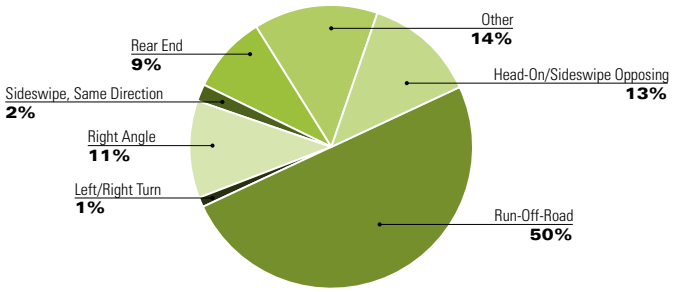
Proportion of severe speeding-related crashes along curves by jurisdiction and area type

	Rural		Urban		Other		Statewide	
State Trunk Highways	97 of 294	33%	62 of 197	31%	4 of 7	57%	163 of 498	33%
County Roads	**195 of 334**	**58%**	36 of 143	25%	5 of 16	31%	236 of 493	48%
City	8 of 24	33%	71 of 201	35%	1 of 10	10%	80 of 235	34%
Township	25 of 69	36%	0 of 0	0%	6 of 9	67%	31 of 78	40%
Other	2 of 2	100%	0 of 0	0%	1 of 3	33%	3 of 5	60%
All Jurisdictions	327 of 723	45%	169 of 541	31%	17 of 45	38%	513 of 1309	39%

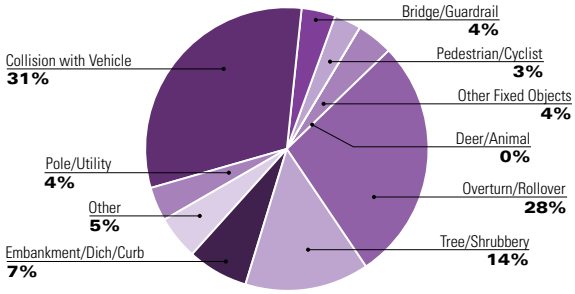
58% of severe crashes on rural county roads reporting speed as a contributing factor occur on curves.

39% of all severe crashes involving speeding occurr along a curve.

Crash diagram distribution



First harmful event



Relationship to Road Parameters

Road design type and speed limit distribution of severe speeding-related crashes in **rural** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	2	<1%	0	0%	59	5%	61	5%
Other Divided Highway	0	0%	0	0%	1	<1%	49	4%	50	4%
4-6 Lanes	0	0%	0	0%	0	0%	8	1%	8	1%
3-Lane and 5-Lane	0	0%	0	0%	0	0%	0	0%	0	0%
2-Lane Roadway	8	1%	51	4%	14	1%	508	39%	581	44%
One-Way Street	0	0%	1	<1%	0	0%	0	0%	1	<1%
Other	1	<1%	5	<1%	0	0%	16	1%	22	2%
All Roadways	9	1%	59	5%	15	1%	640	49%	723	55%

Road design type and speed limit distribution of severe speeding-related crashes in urban areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	8	1%	3	<1%	108	8%	119	9%
Other Divided Highway	0	0%	10	1%	11	1%	55	4%	76	6%
4-6 Lanes	0	0%	37	3%	24	1%	24	1%	85	5%
3-Lane and 5-Lane	0	0%	6	<1%	1	<1%	2	<1%	9	1%
2-Lane Roadway	7	1%	149	11%	27	2%	51	4%	234	18%
One-Way Street	0	0%	8	1%	2	<1%	0	0%	10	1%
Other	2	<1%	3	<1%	0	0%	3	<1%	8	1%
All Roadways	9	1%	221	17%	68	5%	243	18%	541	41%

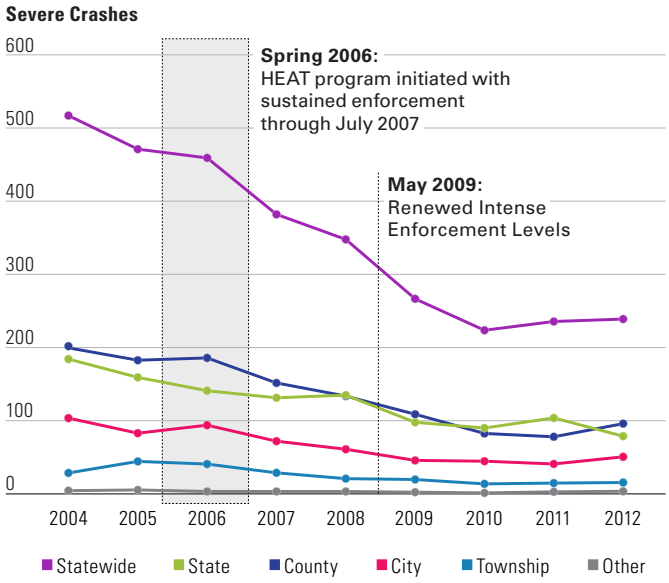
Severe crashes speeding-related crashes are notably represented in both rural and urban areas.

39% of this severe crash type occurs on rural two-lane roads with a high speed limit (≥ 45 mph); this means that 70% of severe speeding-related crashes in rural areas occur on rural high-speed two-lane roads.

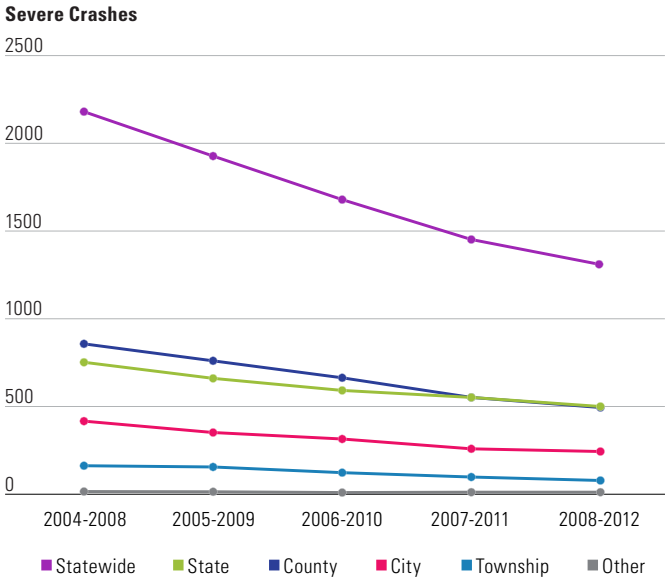
Urban high-speed freeways (8% of severe speeding crashes) and urban 30 mph two-lane roadways (11% of severe speeding crashes) represent 48% of severe speeding-related crashes in urban areas.

Trends

Severe crashes involving speeding



Five year rolling total of severe crashes involving speeding



Focus Areas

Interaction with other safety focus areas

Unlicensed (18% of severe speeding crashes), impaired (45%) drivers are over-represented in severe speeding-related crashes.

49% of severe speeding-related crashes include unbelted occupants.

62% of severe speeding-related crashes are a lane departure crash, a 17% increase compared to all severe crashes.

Focus Area	Severe Speeding-Related Crashes	Percentage of Speeding-Related Crashes	Percentage of All Severe Crashes	Difference
Impaired	593	45.3%	26.3%	+19.0% ↑
Lane Departure	814	62.2%	45.5%	+16.7% ↑
Unbelted	635	48.5%	35.0%	+13.5% ↑
Unlicensed	232	17.7%	10.0%	+7.7% ↑
Younger	303	23.1%	19.4%	+3.7% —
Motorcyclist	240	18.3%	17.7%	+0.7% —
Commercial Vehicle	99	7.6%	10.1%	-2.6% —
Bicyclist	5	0.4%	4.1%	-3.7% —
Pedestrian	35	2.7%	9.2%	-6.6% ↓
Older	78	6.0%	14.6%	-8.7% ↓
Intersection	420	32.1%	41.9%	-9.8% ↓
Inattentive	97	7.4%	18.7%	-11.3% ↓

Demographics

Age and sex of drivers involved

77% of drivers in severe speeding-related crashes are male.

Drivers aged 25 and younger are reported to account for 41% of speeding-related severe crashes. This increases to 63% for drivers aged 35 and younger.

Age	Male		Female		Other/Unknown		All Speeding Drivers	
<21	182	14%	87	7%	1	<1%	270	20%
21 to 25	227	17%	52	4%	0	0%	279	21%
26 to 35	239	18%	49	4%	0	0%	288	22%
36 to 45	161	12%	46	3%	0	0%	207	16%
46 to 55	114	9%	30	2%	0	0%	144	11%
56 to 65	64	5%	19	1%	0	0%	83	6%
>65	25	2%	12	1%	0	0%	37	3%
Unknown	2	<1%	1	<1%	12	1%	15	1%
Total	1014	77%	296	22%	13	1%	1323	100%

When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	14	11	16	23	15	23	26	23	11	23	16	13	214	16%
3:00 AM to 5:59 AM	2	4	11	5	9	10	11	7	10	12	9	7	97	7%
6:00 AM to 8:59 AM	26	14	21	3	9	6	10	8	11	9	13	15	145	11%
9:00 AM to 11:59 AM	14	8	7	11	8	6	6	8	6	8	14	17	113	9%
Noon to 2:59 PM	16	20	11	15	21	24	18	17	27	10	18	23	220	17%
3:00 PM to 5:59 PM	10	19	10	21	27	20	20	18	17	19	13	10	204	16%
6:00 PM to 8:59 PM	2	9	5	11	14	10	27	14	4	10	8	8	122	9%
9:00 PM to Midnight	11	11	11	14	15	21	25	22	14	13	13	13	183	14%
Total	95	96	92	103	118	120	143	117	100	104	104	106	1298	100%
	7%	7%	7%	8%	9%	9%	11%	9%	8%	8%	8%	8%		

Severe crashes involving speeding occur relatively sporadically compared to other severe crash types.

*While there are a total of 1,309 severe speeding-related crashes, the time of crash was unknown for 11. Therefore, the total reflected in this table is 1,298.

Light conditions

Light Conditions	Severe Speeding-Related Crashes	Percentage	All Severe Crashes
Daylight	666	51%	61%
Sunrise	29	2%	3%
Sunset	40	3%	3%
Night/Dark	567	43%	33%
Street Lights On	227	17%	14%
Street Lights Off	15	1%	1%
No Street Lights	313	24%	17%
Unknown Lighting	12	1%	1%
Other/Unknown	7	1%	1%

43% of severe speeding-related crashes occur during nighttime driving conditions. This includes 25% of these crashes that occur under unlit conditions.

51% of severe speeding-related crashes occurred in daylight, but this is 10% less than the average for all severe crashes.

Road surface conditions

Road Surface Conditions	Severe Speeding-Related Crashes	Percentage	All Severe Crashes
Dry	920	70%	78%
Wet	106	8%	9%
Snow/Slush/Ice	253	19%	11%
Mud/Debris	7	1%	<1%
Other	23	2%	2%

19% of severe speeding-related crashes occur on snowy or icy pavement, suggesting speeding under such conditions facilitates an increased risk of a severe crash.

Fatal and Serious Injury Crashes:

Older Drivers

Fatal and serious injury crashes
1,028 Severe Crashes
206 severe crashes per year
14.6% of all severe crashes

Crashes of all severities
47,222 crashes
9,444 crashes per year
13.1% of all crashes

On Minnesota roadways, there were 1,028 severe crashes involving older drivers between 2008 and 2012. This is an average of 206 severe crashes per year and accounted for 14.6% of all severe crashes during the five-year period.

Statewide Crash Statistics

Jurisdiction and area type distribution of severe crashes involving older drivers

	Rural		Urban		Other		Statewide	
State Trunk Highways	313	30%	147	14%	6	1%	466	45%
County Roads	218	21%	159	15%	7	1%	384	37%
City	9	1%	132	13%	9	1%	150	15%
Township	24	2%	0	0%	2	<1%	26	3%
Other	0	0%	1	<1%	1	<1%	2	<1%
All Jurisdictions	564	55%	439	42%	25	3%	1028	100%

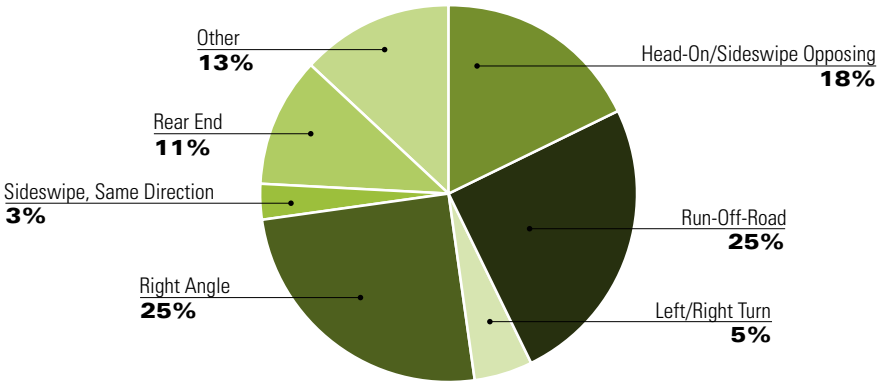
Severe crashes involving older drivers are distributed among State (45%) and Local (54%) roadway systems, and among urban and rural areas.

Crash type distribution of severe crashes involving older drivers

Harmful Event	Severe Crashes	Percentage	All Severe Crashes
Collision with Vehicle	708	69%	43%
Pedestrian/Cyclist	90	9%	13%
Overturn/Rollover	60	6%	16%
Other	44	4%	5%
Embankment/Ditch/Curb	29	3%	5%
Tree/Shrubbery	28	3%	7%
Other Fixed Objects	23	2%	3%
Pole/Utility	18	2%	3%
Bridge/Guardrail	15	1%	2%
Deer/Animal	13	1%	2%

Older drivers involved in severe crashes are more likely to be involved in a collision with another vehicle than drivers in all severe crashes, and less likely to be involved in any other crash type.

Crash Diagram Distribution



Relationship to Road Parameters

Road design type and speed limit distribution of severe crashes involving older drivers in **rural** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	1	<1%	0	0%	21	2%	22	2%
Other Divided Highway	0	0%	1	<1%	0	0%	49	5%	50	5%
4-6 Lanes	0	0%	0	0%	1	<1%	11	1%	12	1%
3-Lane and 5-Lane	0	0%	0	0%	0	0%	4	<1%	4	<1%
2-Lane Roadway	1	<1%	32	3%	9	1%	412	40%	454	44%
One-Way Street	0	0%	0	0%	0	0%	0	0%	0	0%
Other	3	<1%	3	<1%	0	0%	16	2%	22	2%
All Roadways	4	<1%	37	4%	10	1%	513	50%	564	55%

Road design type and speed limit distribution of severe crashes involving older drivers in **urban** areas

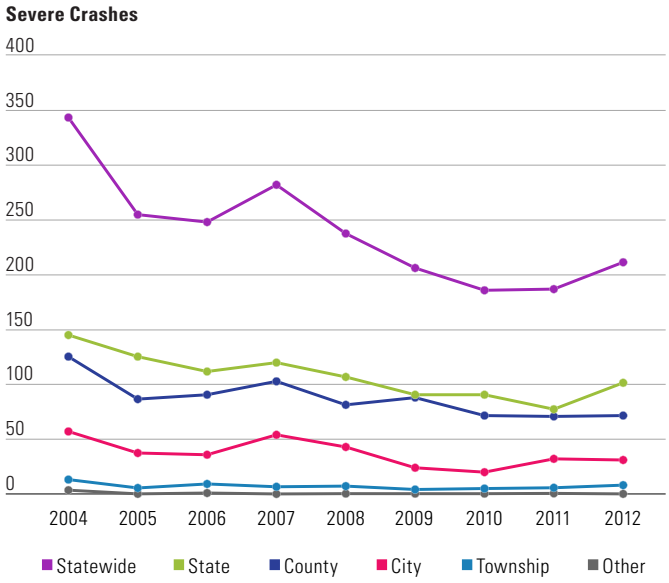
	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	3	<1%	3	<1%	35	3%	41	4%
Other Divided Highway	0	0%	8	1%	21	2%	60	6%	89	9%
4-6 Lanes	0	0%	53	5%	33	3%	32	3%	118	11%
3-Lane and 5-Lane	0	0%	6	1%	8	1%	0	0%	14	1%
2-Lane Roadway	2	<1%	74	7%	19	2%	41	4%	136	13%
One-Way Street	0	0%	7	1%	0	0%	0	0%	7	1%
Other	7	1%	17	2%	8	1%	2	<1%	34	3%
All Roadways	9	1%	168	16%	92	9%	170	17%	439	42%

In rural areas, two-lane roadways with speed limits greater than 45 mph account for 40% of all severe crashes involving older drivers; this means that 73% of severe crashes involving older drivers in rural areas occur on two-lane, high-speed roadways.

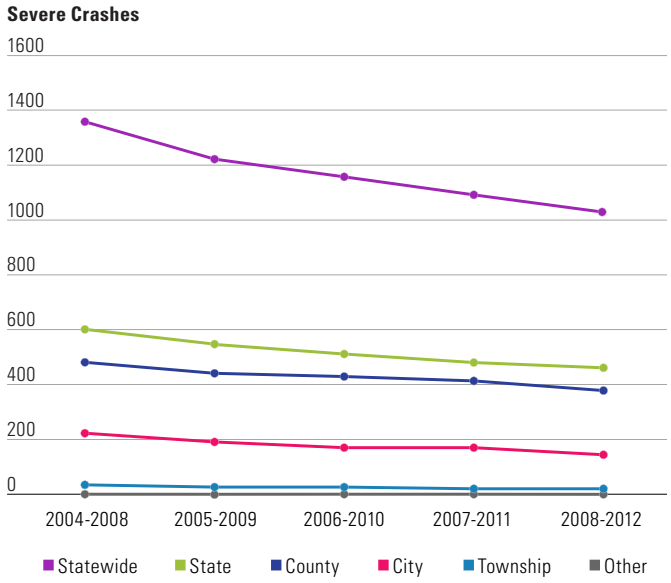
In urban areas, high- and low-speed roadways are notably represented as locations at which severe crashes involving older drivers occur.

Trends

Severe crashes involving older drivers



Five year rolling total of severe crashes involving older drivers



Focus Areas

Interaction with other safety focus areas

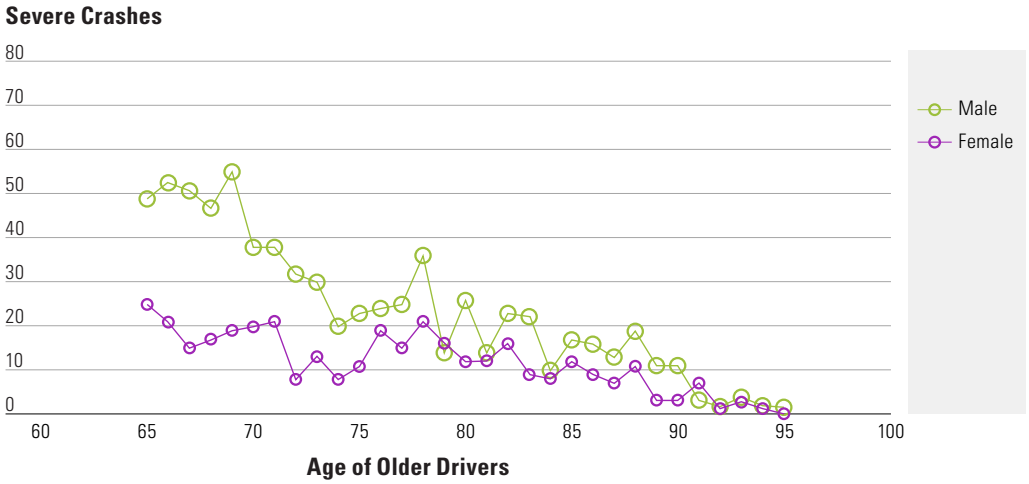
Focus areas overrepresented in severe crashes involving older drivers include Intersections (53% of all severe older driver crashes), Commercial Vehicles (16% of all severe older driver crashes), and Inattentive driving (23% of all severe older driver crashes).

Focus Area	Severe Crashes with Older Drivers	Percentage of Crashes with Older Drivers	Percentage of All Severe Crashes	Difference
Intersection	541	52.6%	41.9%	+10.8% ↑
Commercial Vehicle	160	15.6%	10.1%	+5.4% ↑
Inattentive	234	22.8%	18.7%	+4.0% —
Bicyclist	28	2.7%	4.1%	-1.3% —
Pedestrian	65	6.3%	9.2%	-2.9% —
Motorcyclist	129	12.5%	17.7%	-5.1% ↓
Unlicensed	45	4.4%	10.0%	-5.6% ↓
Unbelted	301	29.3%	35.0%	-5.7% ↓
Younger	122	11.9%	19.4%	-7.6% ↓
Lane Departure	376	36.6%	45.5%	-8.9% ↓
Speeding	78	7.6%	18.6%	-11.0% ↓
Impaired	96	9.3%	26.3%	-17.0% ↓

Demographics

Age and sex of older drivers

The gender gap begins to close between the ages of 75 and 80.



When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	0	1	0	0	0	1	0	2	1	2	0	2	107	8%
3:00 AM to 5:59 AM	0	1	1	2	1	2	2	1	1	0	1	0	81	6%
6:00 AM to 8:59 AM	10	8	7	4	5	9	8	7	9	16	5	8	170	13%
9:00 AM to 11:59 AM	14	13	13	11	22	14	19	21	19	16	19	13	118	9%
Noon to 2:59 PM	14	21	16	31	45	40	41	42	39	34	22	29	328	24%
3:00 PM to 5:59 PM	6	14	12	12	29	18	21	19	23	21	22	22	269	20%
6:00 PM to 8:59 PM	2	2	6	6	6	1	10	5	6	16	6	6	141	10%
9:00 PM to Midnight	3	1	1	3	4	6	4	5	3	3	2	5	146	11%
Total	49	61	56	69	112	91	105	102	101	108	77	85	1016	100%
	5%	6%	6%	7%	11%	9%	10%	10%	10%	11%	8%	8%		

87% of severe crashes involving older drivers occur between 6:00 AM and 6:00 PM; 58% of this severe crash type occurs between noon and 6:00 PM.

Correspondingly, 81% of severe crashes involving older drivers occur under daylight conditions, compared to a lower 61% for all severe crashes.

Road surface conditions for severe crashes involving older drivers reflect those for all severe crashes.

*While there are a total of 1,028 severe crashes involving older drivers, the time of crash was unknown for 12. Therefore, the total reflected in this table is 1,016.

Fatal and Serious Injury Crashes:

Young Drivers

Fatal and serious injury crashes
1,367 Severe Crashes
273 severe crashes per year
19.4% of all severe crashes

Crashes of all severities
82,583 crashes
16,517 crashes per year
22.8% of all crashes

On Minnesota roadways, there were 1,367 severe crashes involving younger drivers between 2008 and 2012. This is an average of 273 severe crashes per year and accounted for 19.4% of all severe crashes during the five-year period.

Statewide Crash Statistics

Jurisdiction and area type distribution of severe crashes involving younger drivers

	Rural		Urban		Other		Statewide	
State Trunk Highways	284	21%	170	12%	11	1%	465	34%
County Roads	327	24%	239	17%	15	1%	581	43%
City	26	2%	197	14%	9	1%	232	17%
Township	68	5%	4	<1%	14	1%	86	6%
Other	1	<1%	0	0%	2	<1%	3	<1%
All Jurisdictions	706	52%	610	44%	51	4%	1367	100%

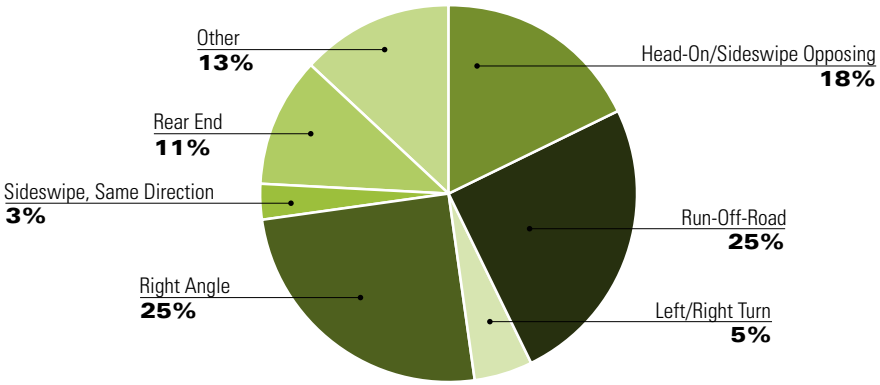
The County roadway system in rural areas represent 24% of all severe crashes involving younger drivers, followed by the State roadway system with 21% of these severe crashes.

Crash type distribution of severe crashes involving younger drivers

Harmful Event	Severe Crashes	Percentage	All Severe Crashes
Collision with Vehicle	779	57%	43%
Overturn/Rollover	192	14%	16%
Pedestrian/Cyclist	101	7%	13%
Tree/Shrubbery	90	7%	7%
Other	56	4%	5%
Embankment/Ditch/Curb	51	4%	5%
Pole/Utility	34	2%	3%
Other Fixed Objects	33	2%	3%
Bridge/Guardrail	25	2%	2%
Deer/Animal	6	<1%	2%

Younger drivers involved in severe crashes are more likely to collide with another vehicle than drivers involved in all severe crashes.

Crash Diagram Distribution



Relationship to Road Parameters

Road design type and speed limit distribution of severe crashes involving younger drivers in **rural** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	0	<1%	0	0%	32	2%	32	2%
Other Divided Highway	0	0%	2	<1%	1	<1%	38	3%	41	3%
4-6 Lanes	0	0%	2	<1%	0	0%	8	1%	10	1%
3-Lane and 5-Lane	0	0%	0	0%	1	<1%	4	<1%	5	<1%
2-Lane Roadway	4	<1%	39	3%	13	1%	517	38%	573	42%
One-Way Street	0	0%	0	0%	0	0%	0	0%	0	0%
Other	2	<1%	4	<1%	3	<1%	36	3%	45	3%
All Roadways	6	<1%	47	3%	18	1%	635	46%	706	52%

38% (517 of 1367) of all severe crashes involving younger drivers occurred on two-lane, high-speed (≥ 45 mph) roadways in rural areas.

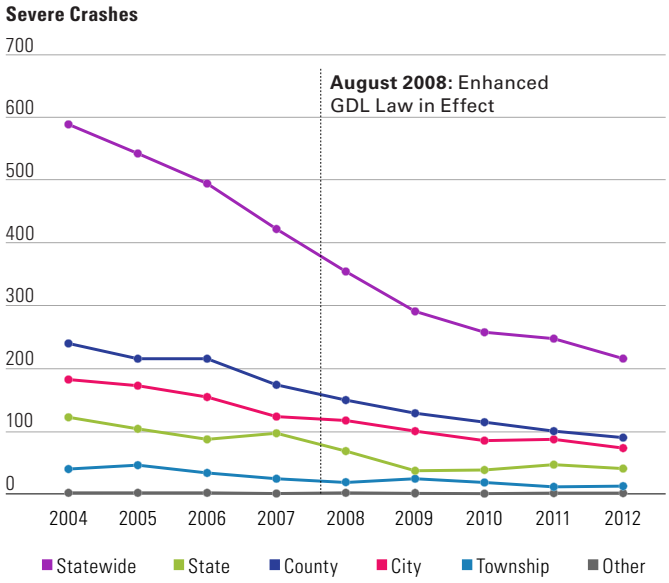
Road design type and speed limit distribution of severe crashes involving younger drivers in **urban** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	2	<1%	1	<1%	52	4%	55	4%
Other Divided Highway	0	0%	12	1%	21	2%	75	5%	108	8%
4-6 Lanes	1	<1%	55	4%	43	3%	45	3%	144	11%
3-Lane and 5-Lane	0	0%	3	<1%	8	1%	3	<1%	14	1%
2-Lane Roadway	4	<1%	130	10%	29	2%	68	5%	231	17%
One-Way Street	0	0%	6	<1%	1	<1%	0	0%	7	1%
Other	9	1%	18	1%	5	<1%	19	1%	51	4%
All Roadways	14	1%	226	17%	108	8%	262	19%	610	45%

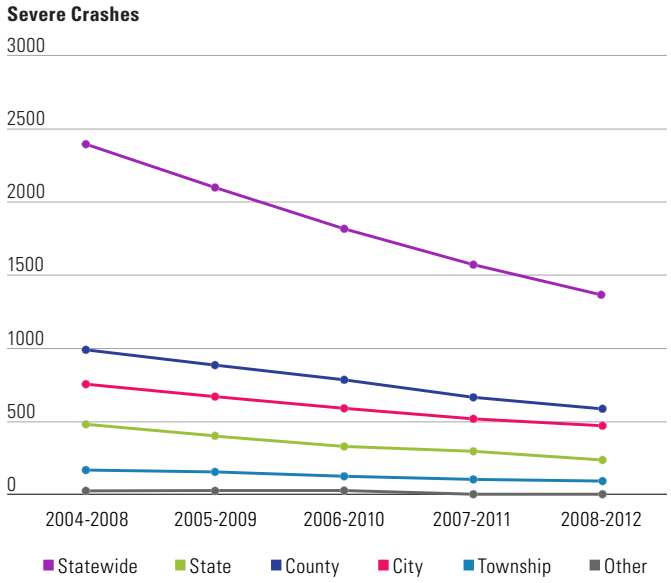
57% (348 of 610) of severe urban crashes occurred on low-speed (≤ 40 mph) roadways.

Trends

Severe crashes involving younger drivers



Five year rolling total of severe crashes involving younger drivers



Focus Areas

Interaction with other safety focus areas

Severe crashes involving younger drivers were more likely to include unbelted occupants.

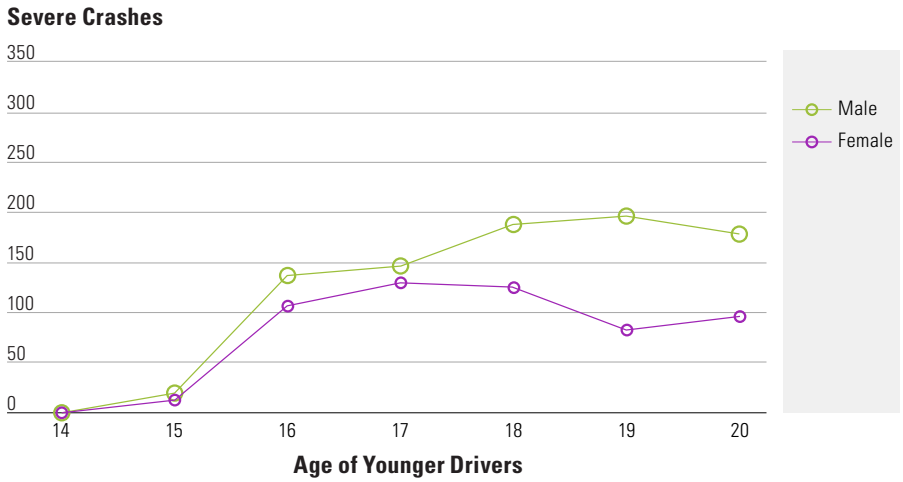
Younger drivers involved in severe crashes were less likely to be impaired or for the crash to involve a motorcycle.

Focus Area	Severe Crashes with Younger Drivers	Percentage of Crashes with Younger Drivers	Percentage of All Severe Crashes	Difference
Unbelted	572	41.8%	35.0%	+6.8% ↑
Speeding	303	22.2%	18.6%	+3.6% —
Inattentive	289	21.1%	18.7%	+2.4% —
Intersection	600	43.9%	41.9%	+2.0% —
Unlicensed	126	9.2%	10.0%	-0.8% —
Bicyclist	31	2.3%	4.1%	-1.8% —
Lane Departure	596	43.6%	45.5%	-1.9% —
Commercial Vehicle	99	7.2%	10.1%	-2.9% —
Pedestrian	74	5.4%	9.2%	-3.8% —
Older	122	8.9%	14.6%	-5.7% ↓
Impaired	267	19.5%	26.3%	-6.8% ↓
Motorcycle	135	9.9%	17.7%	-7.8% ↓

Demographics

Age and sex of young drivers

The gender gap is small until approximately age 18, after which younger male drivers were involved in notably more severe crashes than younger female drivers.



When Crashes are Occurring (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	7	2	12	10	12	10	16	9	6	9	8	6	107	8%
3:00 AM to 5:59 AM	5	2	3	6	7	11	12	10	5	7	9	4	81	6%
6:00 AM to 8:59 AM	17	15	22	14	16	10	13	8	12	17	12	14	170	13%
9:00 AM to 11:59 AM	15	6	8	4	5	15	12	18	4	10	8	13	118	9%
Noon to 2:59 PM	20	25	18	23	35	38	36	24	35	22	26	26	328	24%
3:00 PM to 5:59 PM	19	12	8	23	33	23	35	29	21	30	17	19	269	20%
6:00 PM to 8:59 PM	9	12	12	6	11	13	23	12	11	12	13	7	141	10%
9:00 PM to Midnight	10	5	4	15	14	16	18	19	14	12	11	8	146	11%
Total	102	79	87	101	133	136	165	129	108	119	104	97	1360	100%
	8%	6%	6%	7%	10%	10%	12%	9%	8%	9%	8%	7%		

Crashes are slightly overrepresented in summer months (May through August), and slightly underrepresented in winter months (November through March).

*While there were a total of 1,367 severe crashes involving younger drivers, the time of crash was unknown for seven. Therefore, the total reflected in this table is 1,360.

Light conditions

Light Condition	Severe Crashes with Younger Drivers	Percentage	All Severe Crashes
Daylight	855	63%	61%
Sunrise	38	3%	3%
Sunset	33	2%	3%
Night/Dark	433	32%	33%
Street Lights On	198	14%	14%
Street Lights Off	11	1%	1%
No Street Lights	214	16%	17%
Unknown Lighting	10	1%	1%
Other/Unknown	8	1%	1%

Severe crashes involving younger drivers follow the patterns of all severe crashes, which means a majority occurred during the day and that the pavement was dry.

Road surface conditions

Road Surface Condition	Severe Crashes with Younger Drivers	Percentage	All Severe Crashes
Dry	1019	75%	78%
Wet	138	10%	9%
Snow/Slush/Ice	174	13%	11%
Mud/Debris	5	<1%	<1%
Other	31	2%	2%

Fatal and Serious Injury Crashes:

Motorcyclists

Fatal and serious injury crashes
1,244 severe crashes
249 severe crashes per year
17.7% of all severe crashes

Crashes of all severities
7,316 crashes
1,463 crashes per year
2.0% of all crashes

On Minnesota roadways, there were 1,244 severe crashes involving a motorcyclist between 2008 and 2012. This is an average of 249 severe crashes per year and accounted for 18% of all severe crashes during the five-year period.

Statewide Crash Statistics

Jurisdiction and area type distribution of severe crashes involving motorcycles

	Rural		Urban		Other		Statewide	
State Trunk Highways	208	17%	186	15%	7	1%	401	32%
County Roads	363	29%	184	15%	16	1%	563	45%
City	21	2%	212	17%	10	1%	243	20%
Township	23	2%	0	0%	6	<1%	29	2%
Other	2	<1%	0	0%	6	<1%	8	1%
All Jurisdictions	617	50%	582	47%	45	4%	1244	100%

Rural and urban areas are both well represented, accounting for 50% and 47% of severe motorcycle crashes, respectively.

In rural areas, the County system accounts for 59% (363 of 617) of these severe crashes; in urban areas, State, City, and County systems all represent an approximate third of these severe urban motorcycle crashes.

Proportion of severe motorcycle crashes along curves by jurisdiction and area type

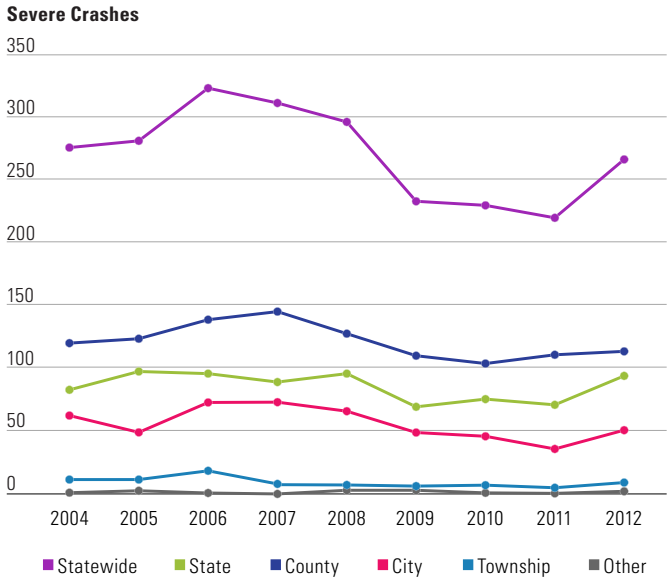
	Rural		Urban		Other		Statewide	
State Trunk Highways	71 of 208	34%	43 of 186	23%	1 of 7	14%	115 of 401	29%
County Roads	166 of 363	46%	37 of 184	20%	9 of 16	56%	212 of 563	38%
City	3 of 21	14%	51 of 212	24%	4 of 10	40%	58 of 243	24%
Township	7 of 23	30%	0 of 0	0%	3 of 6	50%	10 of 29	34%
Other	2 of 2	100%	0 of 0	0%	2 of 6	33%	4 of 8	50%
All Jurisdictions	249 of 617	40%	131 of 582	23%	19 of 45	42%	399 of 1244	32%

40% of severe motorcycle crashes in rural areas, and 46% of severe motorcycle crashes on the County system in rural areas, were along curves; for all severe crashes the equivalent values are 28% and 34%, respectively.

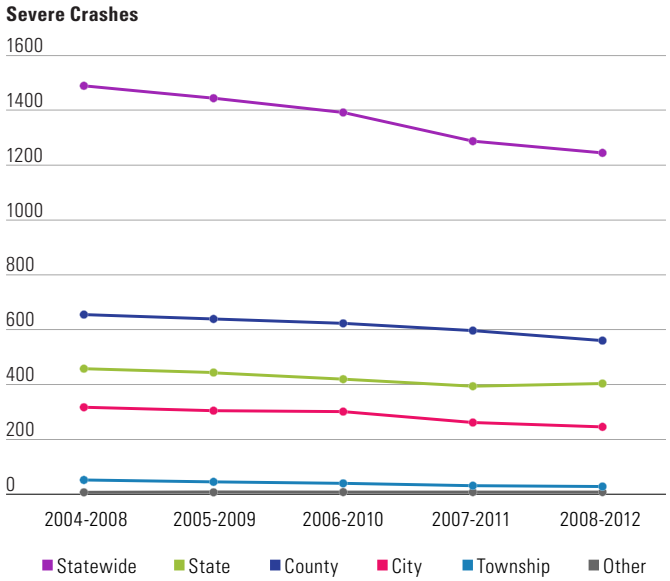
Although lower than rural areas, 23% of severe motorcycle crashes in urban areas were along curves, compared to 15% for all severe crashes.

Trends

Severe crashes involving motorcyclists



Five year rolling total of severe crashes involving motorcyclists



Focus Areas

Interaction with other safety focus areas

Motorcycle crashes were not strongly related to an increase in any other focus areas.

Motorcyclists were less likely to be younger.

Motorcyclists were less likely to be involved with a pedestrian, bicycle, or commercial vehicle severe crash.

Focus Area	Severe Motorcycle Crashes	Percentage of Motorcycle Crashes	Percentage of All Severe Crashes	Difference
Speeding	240	19.3%	18.6%	+0.7% —
Intersection	522	42.0%	41.9%	+0.1% —
Unlicensed	92	7.4%	10.0%	-2.6% —
Bicyclist	6	0.5%	4.1%	-3.6% —
Impaired	280	22.5%	26.3%	-3.8% —
Older	129	10.4%	14.6%	-4.2% —
Inattentive	180	14.5%	18.7%	-4.3% —
Lane Departure	481	38.7%	45.5%	-6.8% ↓
Commercial Vehicle	32	2.6%	10.1%	-7.6% ↓
Younger	135	10.9%	19.4%	-8.6% ↓
Pedestrian	8	0.6%	9.2%	-8.6% ↓

Demographics

Age and sex of motorcyclists involved

91% of motorcyclists in severe crashes were male.

Motorcyclists between the ages of 36 and 65 constitute 60%.

Age	Male		Female		Other/Unknown		All Motorcyclists Involved	
<21	64	5%	4	<1%	0	0%	68	5%
21 to 25	106	8%	4	<1%	0	0%	110	9%
26 to 35	182	14%	16	1%	0	0%	198	15%
36 to 45	233	18%	32	2%	0	0%	265	21%
46 to 55	319	25%	28	2%	0	0%	347	27%
56 to 65	213	17%	18	1%	0	0%	231	18%
>65	53	4%	3	<1%	0	0%	56	4%
Unknown	2	<1%	0	0%	6	<1%	8	1%
Total	1172	91%	105	8%	6	<1%	1283	100%

When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	0	0	2	4	7	10	12	15	4	6	0	0	60	5%
3:00 AM to 5:59 AM	0	0	0	0	2	3	8	3	2	3	0	0	21	2%
6:00 AM to 8:59 AM	0	0	3	5	8	16	17	13	13	2	1	0	78	6%
9:00 AM to 11:59 AM	0	0	1	6	12	16	28	22	10	7	4	0	106	9%
Noon to 2:59 PM	0	1	8	28	49	64	57	62	50	17	16	0	352	29%
3:00 PM to 5:59 PM	0	0	8	27	44	48	51	58	36	29	10	0	311	25%
6:00 PM to 8:59 PM	0	0	2	13	22	20	38	24	28	10	4	0	161	13%
9:00 PM to Midnight	0	0	1	8	20	27	43	24	10	5	1	0	139	11%
Total	0	1	25	91	164	204	254	221	153	79	36	0	1228	100%
	0%	0%	2%	7%	13%	17%	21%	18%	12%	6%	3%	0%		

Seasonal trends demonstrate 95% of severe motorcycle crashes occurring in the seven-month period from April through October.

54% of severe motorcycle crashes occurred between noon and 6:00 PM.

*While there were a total of 1,244 severe motorcycle crashes, the time of crash was unknown for sixteen. Therefore, the total reflected in this table is 1,228.

Light conditions

Light Condition	Severe Motorcycle Crashes	Percentage	All Severe Crashes
Daylight	940	76%	61%
Sunrise	13	1%	3%
Sunset	43	3%	3%
Night/Dark	241	19%	33%
Street Lights On	106	9%	14%
Street Lights Off	8	1%	1%
No Street Lights	119	10%	17%
Unknown Lighting	8	1%	1%
Other/Unknown	7	1%	1%

76% of severe motorcycle crashes occurred under daylight; this is 15% more than for all severe crashes.

Road surface conditions

Road Surface Condition	Severe Motorcycle Crashes	Percentage	All Severe Crashes
Dry	1185	95%	78%
Wet	31	3%	9%
Snow/Slush/Ice	0	0%	11%
Mud/Debris	12	1%	<1%
Other	16	1%	2%

95% of severe motorcycle crashes occurred on dry pavement.

Fatal and Serious Injury Crashes:

Pedestrians

Fatal and serious injury crashes
649 severe crashes
130 severe crashes per year
9.2% of all severe crashes

Crashes of all severities
4,077 crashes
815 crashes per year
1.1% of all crashes

On Minnesota roadways, there were 649 severe crashes involving a pedestrian between 2008 and 2012. This is an average of 130 severe crashes per year and accounted for 9% of all severe crashes during the five-year period. Although during this time period pedestrian crashes account for only 1% of all crashes, 16% of all pedestrian crashes were severe.

Statewide Crash Statistics

Jurisdiction and area type distribution of severe crashes involving pedestrians

	Rural		Urban		Other		Statewide	
State Trunk Highways	51	8%	111	17%	8	1%	170	26%
County Roads	48	7%	172	27%	2	<1%	222	34%
City	12	2%	224	35%	13	2%	249	38%
Township	4	1%	1	<1%	1	<1%	6	1%
Other	0	<1%	1	<1%	1	<1%	2	<1%
All Jurisdictions	115	18%	509	78%	25	4%	649	100%

Severe crashes involving pedestrians occurred predominantly in urban areas (509 of 649; 78%).

74% of severe pedestrian crashes occur on the local roadway system.

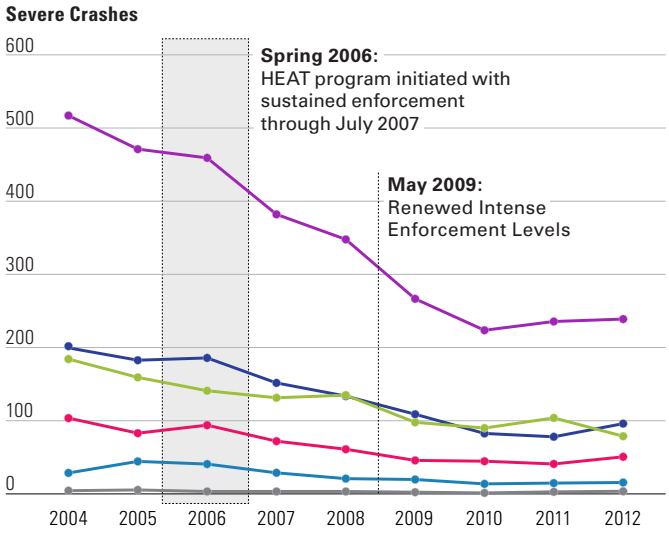
Crash type distribution of severe crashes involving pedestrians

Crossing Location	Severe Crashes	Percentage	All Severe Crashes
Not at Intersection	291	45%	50%
3-Legged Intersection	60	9%	10%
4-Legged Intersection	211	33%	23%
5+ Legged Intersection	1	<1%	<1%
Roundabout/Traffic Circle	0	0%	<1%
School Crossing	0	0%	<1%
Alley/Driveway	13	2%	2%
Other Intersection Related	51	8%	6%
Other/Unknown	22	3%	8%

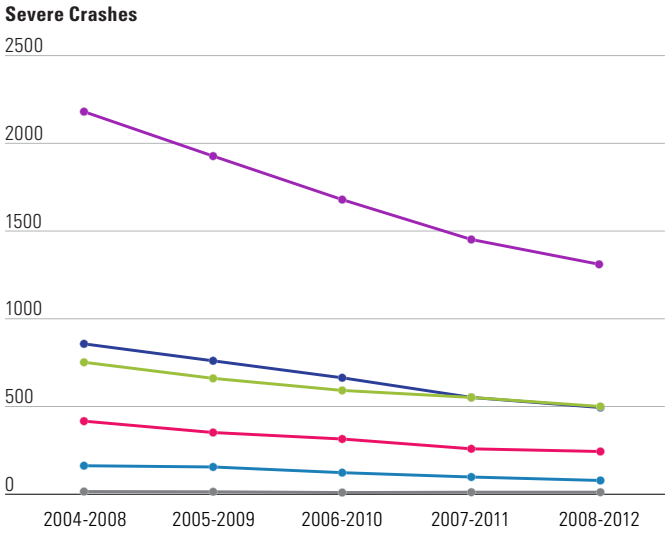
Although the majority of severe pedestrian crashes occurred at intersections, a notable 45% of these crashes did not occur at intersections.

Trends

Severe crashes involving pedestrians



Five year rolling total of severe crashes involving pedestrians



Focus Areas

Interaction with other safety focus areas

51% of severe pedestrian crashes occurred at intersections, as opposed to 42% of all severe crashes.

Of these intersection-related crashes, 53% occurred at a traffic signal and 28% at a stop sign.

With the exception of Intersection, every focus area is underrepresented in pedestrian crashes.

Focus Area	Severe Pedestrian Crashes	Percentage of Pedestrian Crashes	Percentage of All Severe Crashes	Difference
Intersection	328	50.5%	41.9%	+8.7% ▲
Inattentive	119	18.3%	18.7%	-0.4% —
Impaired	165	25.4%	26.3%	0.9% —
Commercial Vehicle	52	8.0%	10.1%	-2.1% —
Bicyclist	1	0.2%	4.1%	-3.9% —
Unlicensed	38	5.9%	10.0%	-4.1% —
Older	65	10.0%	14.6%	-4.6% —
Younger	74	11.4%	19.4%	-8.0% ▼
Speeding	35	5.4%	18.6%	-13.2% ▼
Motorcycle	8	1.2%	17.7%	-16.4% ▼
Lane Departure	159	24.5%	45.5%	-21.0% ▼

Relationship to Road Parameters

Road design type and speed limit distribution of severe crashes involving pedestrians in **urban** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	0	0%	2	<1%	17	3%	19	3%
Other Divided Highway	0	0%	15	2%	17	3%	35	5%	67	10%
4-6 Lanes	1	<1%	110	17%	36	6%	13	2%	160	25%
3-Lane and 5-Lane	0	0%	4	1%	8	1%	3	0%	15	2%
2-Lane Roadway	2	<1%	154	24%	15	2%	15	2%	186	29%
One-Way Street	1	<1%	37	6%	2	<1%	0	0%	40	6%
Other	4	1%	16	2%	0	0%	2	<1%	22	3%
All Roadways	8	1%	336	52%	80	12%	85	13%	509	78%

78% of all severe crashes involving pedestrians occurred in urban areas.

65% of severe pedestrian crashes occurred in on low-speed urban roads (≤ 40 mph), with 53% of crashes on roads with speed limits ≤ 30 mph.

4-6 lane and 2-lane urban roadways accounted for 53% of severe pedestrian crashes.

Demographics

Age and sex of pedestrians involved

Male pedestrians were involved in 61% of severe pedestrian crashes.

Pedestrians between the ages of 15 and 20, and those older than 65 together represent 30% of pedestrians involved in severe crashes.

Males in their early twenties demonstrate the demographic most involved in these severe pedestrian crashes.

Age	Male		Female		Other/Unknown		All Pedestrians	
<9	36	5%	12	2%	0	0%	48	7%
9 to 14	17	2%	15	2%	0	0%	32	5%
15 to 20	56	8%	40	6%	0	0%	96	14%
21 to 25	53	8%	29	4%	0	0%	82	12%
26 to 35	48	7%	23	3%	1	<1%	72	10%
36 to 45	49	7%	29	4%	0	0%	78	11%
46 to 55	52	7%	34	5%	0	0%	86	12%
56 to 65	44	6%	29	4%	0	0%	73	10%
>65	61	9%	50	7%	0	0%	111	16%
Unknown	10	1%	3	<1%	9	1%	22	3%
Total	426	61%	264	38%	10	1%	700	100%

When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	4	1	3	3	11	11	5	10	5	13	6	2	74	12%
3:00 AM to 5:59 AM	1	2	1	2	1	2	5	4	2	5	2	3	30	5%
6:00 AM to 8:59 AM	7	12	4	1	1	4	4	2	4	15	7	4	65	10%
9:00 AM to 11:59 AM	1	5	0	5	3	2	7	5	7	4	4	6	49	8%
Noon to 2:59 PM	8	5	8	10	14	13	10	7	9	11	11	10	116	18%
3:00 PM to 5:59 PM	5	15	7	9	5	7	7	8	13	9	23	18	126	20%
6:00 PM to 8:59 PM	4	7	12	3	4	4	6	3	5	10	9	14	81	13%
9:00 PM to Midnight	4	5	10	12	13	8	12	12	8	6	6	6	102	16%
Total	34	52	45	45	52	51	56	51	53	73	68	63	643	100%
	5%	8%	7%	7%	8%	8%	9%	8%	8%	11%	11%	10%		

Severe crashes involving pedestrians took place year-round and at all times of day.

Late night hours (between midnight and 6:00 AM) during winter months (December through March) are underrepresented in severe pedestrian crashes.

*While there were a total of 649 severe crashes involving pedestrians, the time of crash was unknown for six. Therefore, the total reflected in this table is 643.

Light conditions

Light Condition	Severe Pedestrian Crashes	Percentage	All Severe Crashes
Daylight	276	43%	61%
Sunrise	25	4%	3%
Sunset	9	1%	3%
Night/Dark	336	52%	33%
Street Lights On	254	39%	14%
Street Lights Off	3	0%	1%
No Street Lights	71	11%	17%
Unknown Lighting	8	1%	1%
Other/Unknown	3	0%	1%

Higher than the 33% average for all severe crashes. 52% of severe pedestrian crashes occurred under night/dark conditions (39% were reported to have occurred in areas lit by street lights).

Road surface conditions

Road Surface Condition	Severe Pedestrian Crashes	Percentage	All Severe Crashes
Dry	503	78%	78%
Wet	88	14%	9%
Snow/Slush/Ice	47	7%	11%
Mud/Debris	2	<1%	0%
Other	9	1%	2%

Wet road surface conditions are overrepresented in severe pedestrian crashes, whereas snowy conditions are underrepresented.

8% of severe crashes involving pedestrians occurred under rainy weather conditions, compared to 5% for all severe crashes.

Fatal and Serious Injury Crashes:

Bicyclists

Fatal and serious injury crashes
286 crashes
57 crashes per year
4.1% of all crashes

Crashes of all severities
4,667 crashes
933 crashes per year
1.3% of all crashes

On Minnesota roadways, there were 286 severe crashes involving a bicyclist between 2008 and 2012. This is an average of 57 severe crashes per year and accounted for 4% of all severe crashes during the five-year period.

Statewide Crash Statistics

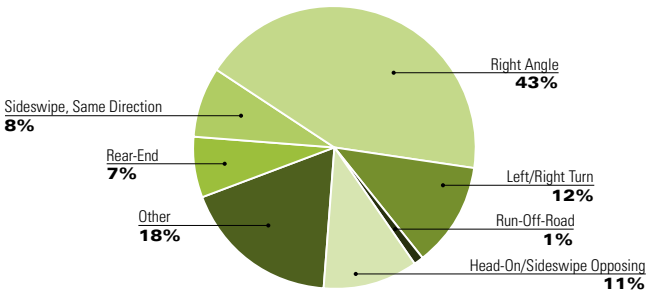
Jurisdiction and area type distribution of severe bicyclist crashes

	Rural		Urban		Other		Statewide	
State Trunk Highways	12	4%	30	11%	0	0%	42	15%
County Roads	17	6%	92	32%	2	1%	111	39%
City	6	2%	120	42%	4	1%	130	45%
Township	3	1%	0	0%	0	0%	3	1%
Other	0	0%	0	0%	0	0%	0	0%
All Jurisdictions	38	13%	242	85%	6	2%	286	100%

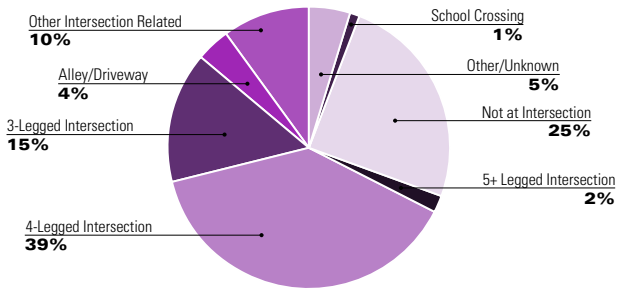
Severe crashes involving bicyclists occurred predominantly in urban areas (242 of 286; 85%).

85% of severe bicyclist crashes occurred on the local roadway system.

Crash diagram distribution

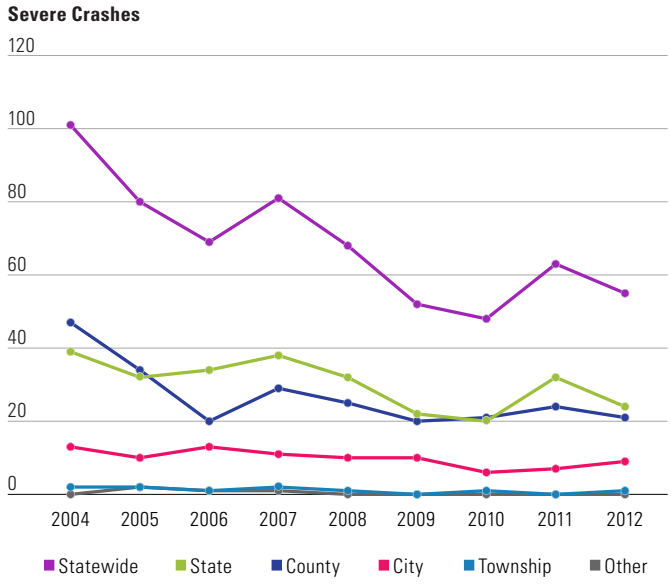


Intersection relation distribution

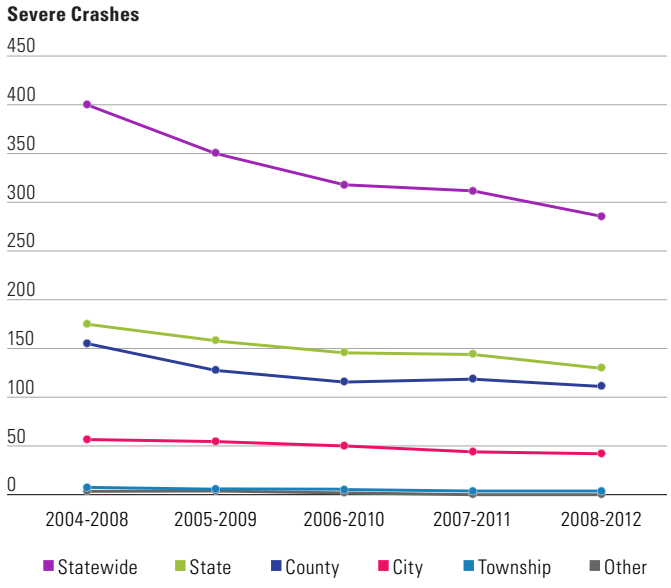


Trends

Severe crashes involving bicyclists



Five year rolling total of severe crashes involving bicyclists



Focus Areas

Interaction with other safety focus areas

67% of severe crashes involving bicyclists occurred at intersections, as opposed to 42% of all severe crashes.

Of these intersection-related crashes, 48% occurred at a traffic signal and 41% at a yield or stop sign.

94% of these severe bicycle crashes occurred on the roadway.

With the exception of Intersection, every focus area is underrepresented in severe bicycle crashes.

Focus Area	Severe Bicyclist Crashes	Percentage of Bicyclist Crashes	Percentage of All Severe Crashes	Difference
Intersection	191	66.8%	41.9%	+24.9% ▲
Commercial Vehicle	20	7.0%	10.1%	-3.2% —
Inattentive	41	14.3%	18.7%	-4.4% ▼
Older	28	9.8%	14.6%	-4.8% ▼
Unlicensed	10	3.5%	10.0%	-6.5% ▼
Younger	31	10.8%	19.4%	-8.6% ▼
Pedestrian	1	0.3%	9.2%	-8.9% ▼
Impaired	31	10.8%	26.3%	-15.5% ▼
Motorcyclist	6	2.1%	17.7%	-15.6% ▼
Speeding	5	1.7%	18.6%	-16.9% ▼
Lane Departure	34	11.9%	45.5%	-33.6% ▼

Relationship to Road Parameters

Road design type and speed limit distribution in **urban*** areas

	<30 mph		30 mph		35 mph - 40 mph		45 mph +		All Speed Limits	
Freeway/Ramps	0	0%	1	<1%	1	<1%	4	1%	6	2%
Other Divided Highway	0	0%	9	3%	8	3%	15	5%	32	11%
4-6 Lanes	1	<1%	39	14%	20	7%	12	4%	72	25%
3-Lane and 5-Lane	0	0%	2	1%	1	<1%	2	1%	5	2%
2-Lane Roadway	6	2%	70	24%	16	6%	4	1%	96	34%
One-Way Street	1	<1%	20	7%	0	0%	0	0%	21	7%
Other	3	1%	4	1%	1	<1%	2	1%	10	3%
All Roadways	11	4%	145	51%	47	16%	39	14%	242	85%

*Statewide distribution follows a similar trend to that in urban areas.

85% of all severe crashes involving bicyclists occurred in urban areas.

Most severe bicycle crashes occurred in urban areas on low-speed roads (≤ 40 mph), with over half of crashes on urban roads with speed limits ≤ 30 mph.

4-6 lane and 2-lane urban roadways were the most common facility types for bicycle crashes in urban areas.

Demographics

Age and sex of bicyclists involved

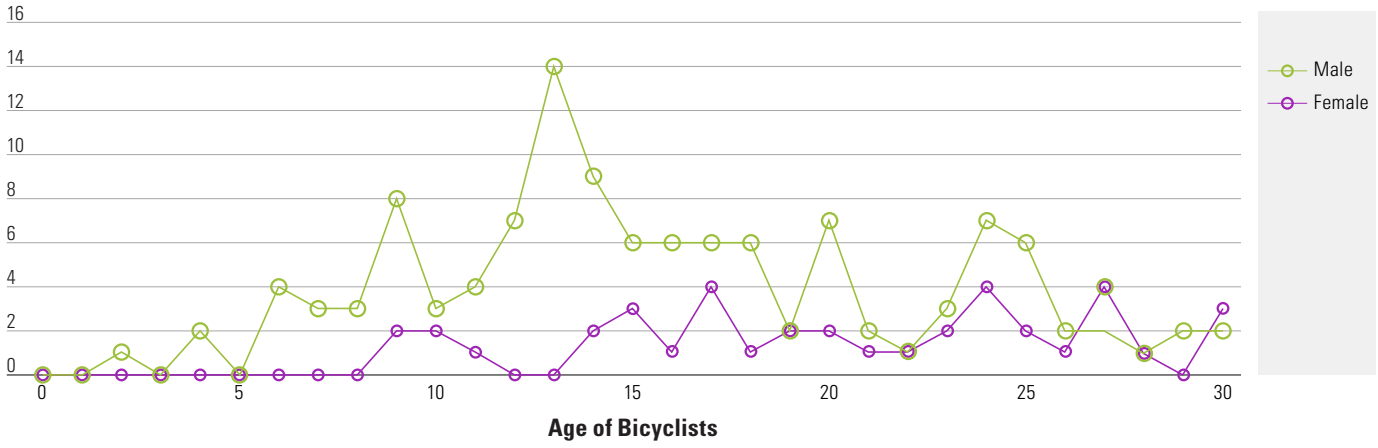
Age	Male		Female		Other/Unknown		All Bicyclists	
<9	13	5%	0	0%	0	0%	13	4%
9 to 14	45	15%	7	2%	0	0%	52	18%
15 to 20	33	11%	13	4%	0	0%	46	16%
21 to 25	19	7%	10	3%	0	0%	29	10%
26 to 35	22	7%	16	6%	0	0%	38	13%
36 to 45	17	6%	1	<1%	0	0%	18	6%
46 to 55	37	13%	7	2%	0	0%	44	15%
56 to 65	21	7%	3	1%	0	0%	24	8%
>65	16	5%	5	2%	0	0%	21	7%
Unknown	6	2%	0	0%	3	1%	9	3%
Total	229	78%	62	21%	3	1%	294	100%

Teenage males were the demographic most involved in these severe bicycle crashes.

Male bicyclists were involved in 78% of severe bicycle crashes.

Bicyclists younger than 21 accounted for 38% of severe bicycle crashes.

Severe Crashes



When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	0	0	0	0	1	0	1	2	3	0	1	0	8	3%
3:00 AM to 5:59 AM	0	0	0	1	0	1	0	1	2	1	0	0	6	2%
6:00 AM to 8:59 AM	1	1	0	5	4	4	4	7	6	3	1	0	36	13%
9:00 AM to 11:59 AM	0	0	1	1	1	4	4	5	6	2	3	0	27	9%
Noon to 2:59 PM	0	1	1	3	6	4	16	18	9	4	3	0	65	23%
3:00 PM to 5:59 PM	0	1	3	6	15	16	10	10	8	8	2	1	80	28%
6:00 PM to 8:59 PM	1	0	1	5	4	5	6	7	4	5	1	0	39	14%
9:00 PM to Midnight	1	1	0	3	2	4	7	2	2	1	2	0	25	9%
Total	3	4	6	24	33	38	48	52	40	24	13	1	286	100%
	1%	1%	2%	8%	12%	13%	17%	18%	14%	8%	5%	<1%		

Severe crashes involving bicyclists rarely took place in winter months, with only 9% of crashes occurring from November through March.

73% of severe bicycle crashes occurred during daytime hours (6:00 AM to 6:00 PM).

Light conditions

Light Conditions	Severe Bicyclist Crashes	Percentage	All Severe Crashes
Daylight	220	77%	61%
Sunrise	6	2%	3%
Sunset	7	2%	3%
Night/Dark	53	19%	33%
Street Lights On	46	16%	14%
Street Lights Off	0	0%	1%
No Street Lights	7	2%	17%
Unknown Lighting	0	0%	1%
Other/Unknown	0	0%	1%

A larger portion (77%) severe bicycle crashes took place under daylight conditions compared to that of all severe crashes (61%).

Road surface conditions

Road Surface Conditions	Severe Bicyclist Crashes	Percentage	All Severe Crashes
Dry	263	92%	78%
Wet	19	7%	9%
Snow/Slush/Ice	4	1%	11%
Mud/Debris	0	0%	<1%
Other	0	0%	2%

92% of severe bicycle crashes occurred on a dry road surface, which is 14 percentage points more than that of all severe crashes (78%).

95% of severe crashes involving bicyclists occurred under favorable weather conditions (clear or cloudy).

Fatal and Serious Injury Crashes:

Commercial Vehicles

Fatal and serious injury crashes
714 severe crashes
143 severe crashes per year
10.1% of all severe crashes

Crashes of all severities
24,854 crashes
4,971 crashes per year
6.9% of all crashes

On Minnesota roadways, there were 714 severe crashes involving a commercial vehicle between 2008 and 2012. This is an average of 143 severe crashes per year and accounted for 10% of all severe crashes during the five-year period.

Statewide Crash Statistics

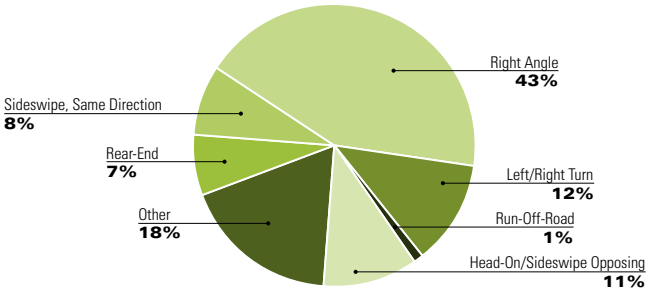
Jurisdiction and area type distribution of severe commercial vehicle crashes

	Rural		Urban		Other		Statewide	
State Trunk Highways	302	42%	122	17%	4	1%	428	60%
County Roads	121	17%	78	11%	3	<1%	202	28%
City	2	<1%	57	8%	7	1%	66	9%
Township	12	2%	0	0%	4	1%	16	2%
Other	1	<1%	0	0%	1	<1%	2	<1%
All Jurisdictions	438	61%	257	36%	19	3%	714	100%

Severe crashes involving commercial vehicles primarily occurred on the State roadway system (428 of 714; 60%), as well as rural areas (438 of 714; 61%).

Crashes on the State roadway system within rural areas accounted for 42% (302 of 714) of these severe crashes.

Crash Diagram Distribution

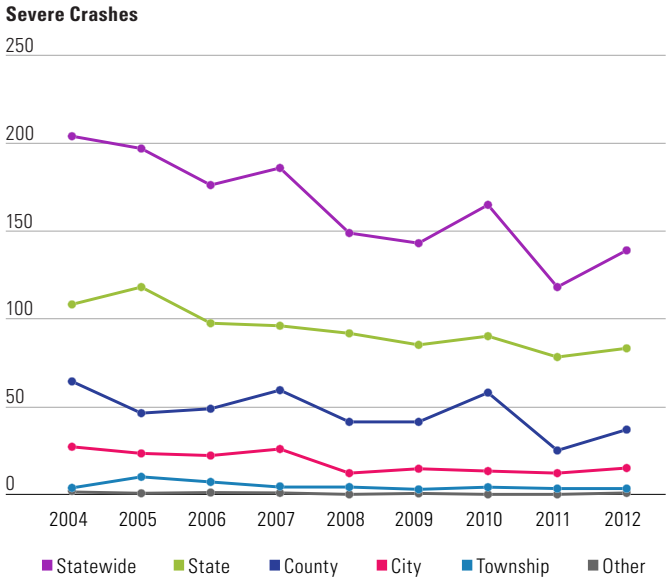


Right angle, head-on and sideswipe opposing, and rear-end severe crashes are overrepresented.

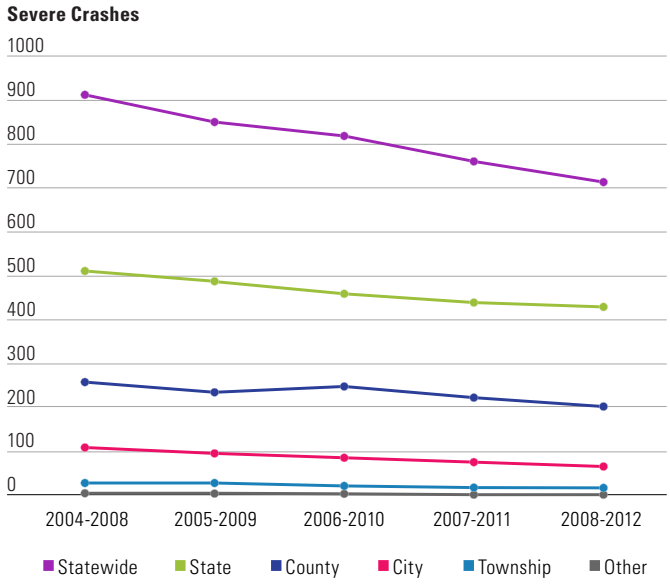
Run-off-road crashes are underrepresented.

Trends

Severe crashes involving commercial vehicles



Five year rolling total of severe crashes involving commercial vehicles



Focus Areas

Interaction with other safety focus areas

50% of severe commercial vehicle crashes were intersection-related.

Of these intersection-related crashes, 25% occurred at a traffic signal and 48% at a yield or stop sign.

Of these intersection-related crashes, 18% occurred at a three-legged intersection, 55% occurred at a four-legged intersection, and 2% occurred at a five-legged intersection.

Focus Area	Severe Commercial Vehicle Crashes	Percentage of Commercial Vehicle Crashes	Percentage of All Severe Crashes	Difference
Intersection	359	50.3%	41.9%	+8.4% ↑
Older	160	22.4%	14.6%	+7.8% ↑
Inattentive	175	24.5%	18.7%	+5.8% ↑
Unbelted	248	34.7%	35.0%	-0.3% —
Bicyclist	20	2.8%	4.1%	-1.3% —
Pedestrian	52	7.3%	9.2%	-1.9% —
Unlicensed	54	7.6%	10.0%	-2.4% —
Speeding	99	13.9%	18.6%	-4.7% —
Younger	99	13.9%	19.4%	-5.6% ↓
Motorcyclist	32	4.5%	17.7%	-13.2% ↓
Lane Departure	218	30.5%	45.5%	-14.9% ↓
Impaired	72	10.1%	26.3%	-16.2% ↓

Demographics

Age and sex of commercial vehicle drivers in severe crashes

97% of commercial vehicle drivers involved in severe crashes were male.

Age	Male		Female		Other/Unknown		All Commercial Vehicle Drivers	
<21	11	2%	0	0%	0	0%	11	2%
21 to 25	33	5%	3	<1%	0	0%	36	5%
26 to 35	102	14%	3	<1%	0	0%	105	15%
26 to 45	140	19%	2	<1%	0	0%	142	20%
46 to 55	214	30%	4	1%	0	0%	218	30%
56 to 65	144	20%	3	<1%	0	0%	147	20%
> 65	56	8%	1	<1%	0	0%	57	8%
Unknown	1	<1%	0	0%	4	1%	5	1%
Total	701	97%	16	2%	4	1%	721	100%

When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	0	2	1	1	0	4	1	3	1	3	1	2	19	3%
3:00 AM to 5:59 AM	1	4	3	2	0	3	1	4	3	8	3	3	35	5%
6:00 AM to 8:59 AM	8	13	7	8	7	7	10	6	13	13	11	11	114	16%
9:00 AM to 11:59 AM	13	12	9	6	14	7	10	15	17	10	7	12	132	19%
Noon to 2:59 PM	22	15	7	14	19	25	16	23	28	18	24	24	235	33%
3:00 PM to 5:59 PM	5	11	5	8	5	13	10	15	12	14	4	9	111	16%
6:00 PM to 8:59 PM	1	2	1	0	0	3	3	3	2	2	3	3	23	3%
9:00 PM to Midnight	5	7	1	4	3	5	3	3	2	3	2	2	40	6%
Total	55	66	34	43	48	67	54	72	78	71	55	66	709	100%
	8%	9%	5%	6%	7%	9%	8%	10%	11%	10%	8%	9%		

83% of severe commercial vehicle crashes occurred between 6:00 AM and 6:00 PM.

58% of severe commercial vehicle crashes occurred from June through October.

*While there were a total of 714 severe commercial vehicle crashes, the time of crash was unknown for five. Therefore, the total reflected in this table is 709.

Light conditions

Light Conditions	Severe Commercial Vehicle Crashes	Percentage	All Severe Crashes
Daylight	562	79%	61%
Sunrise	20	3%	3%
Sunset	5	1%	3%
Night/Dark	125	18%	33%
Street Lights On	45	6%	14%
Street Lights Off	3	0%	1%
No Street Lights	74	10%	17%
Unknown Lighting	3	0%	1%
Other/Unknown	2	0%	1%

79% of severe crashes involving commercial vehicles occurred under daylight conditions, compared to 61% for all severe crashes.

Road surface conditions

Road Surface Conditions	Severe Commercial Vehicle Crashes	Percentage	All Severe Crashes
Dry	517	72%	78%
Wet	84	12%	9%
Snow/Slush/Ice	104	15%	11%
Mud/Debris	1	0%	<1%
Other	8	1%	2%

Adverse road conditions were present in a larger proportion of severe commercial vehicle crashes than the average severe crash.

Fatal and Serious Injury Crashes:

Trains

Fatal and serious injury crashes
21 severe crashes
4 severe crashes per year
0.3% of all severe crashes

Crashes of all severities
167 crashes
33 crashes per year
0.05% of all crashes

On Minnesota roadways, there were 21 severe crashes involving a train between 2008 and 2012. This is an average of 4 severe crashes per year and accounted for 0.03% of all severe crashes during the five-year period.

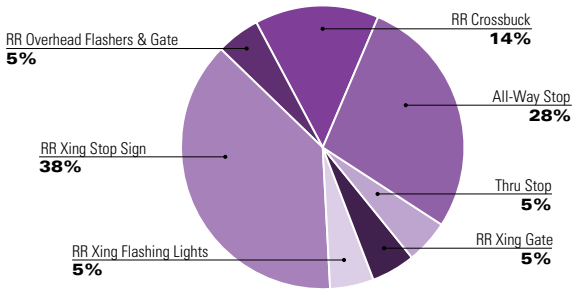
Statewide Crash Statistics

Jurisdiction and area type distribution of severe train crashes

	Rural		Urban		Other		Statewide	
State Trunk Highways	2	10%	0	0%	0	0%	2	10%
County Roads	8	38%	0	0%	0	0%	8	38%
City	1	5%	1	5%	1	5%	3	14%
Township	7	33%	0	0%	1	5%	8	38%
Other	0	0%	0	0%	0	0%	0	0%
All Jurisdictions	18	86%	1	5%	2	10%	21	100%

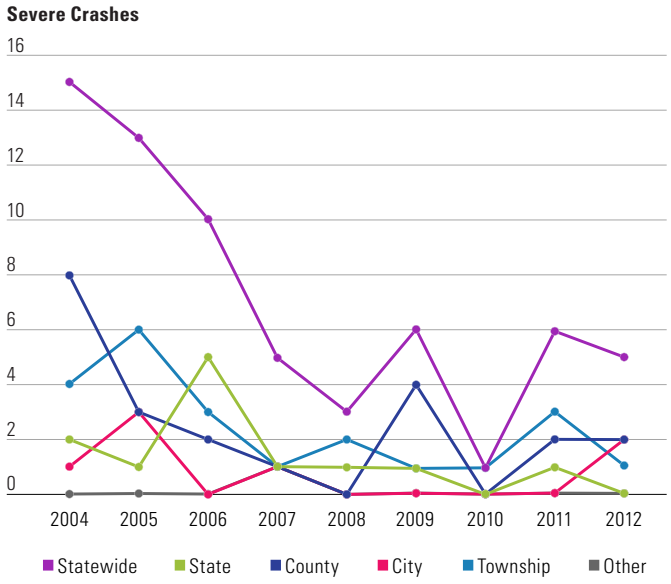
Severe crashes involving trains almost exclusively occurred in rural areas (86%) on the County (38%) and Township (33%) roadway systems.

Traffic Control Device

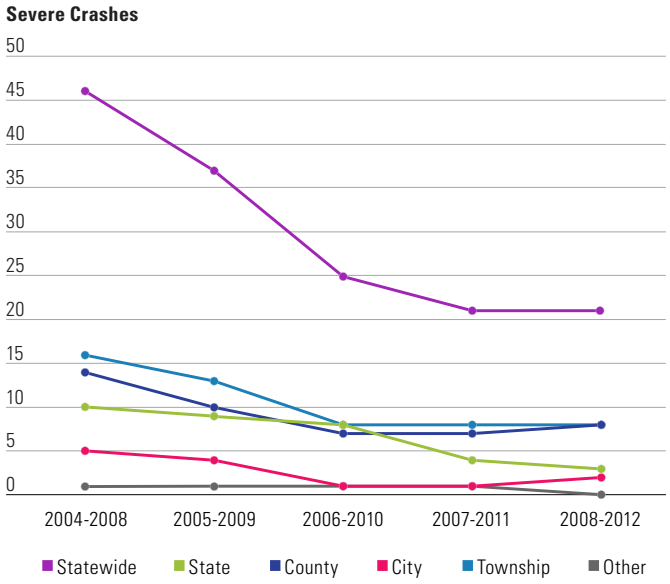


Trends

Severe crashes involving vehicle-train collisions



Five year rolling total of severe crashes involving vehicle-train collisions



Focus Areas

Interaction with other safety focus areas

Commercial vehicles were nearly four times as likely to be involved in a train crash as they were to be involved in any severe crash.

Focus Area	Severe Train Crashes	Percentage of Train Crashes	Percentage of All Severe Crashes	Difference
Commercial Vehicle	8	38.1%	10.1%	+29.7% ↑
Unbelted	11	52.4%	35.0%	+17.4% ↑
Inattentive	6	28.6%	18.7%	+9.8% ↑
Older	4	19.0%	14.6%	+4.4% —
Bicyclist	0	0.0%	14.1%	-4.1% —
Younger	3	14.3%	19.4%	-5.1% ↓
Unlicensed	1	4.8%	10.0%	-5.2% ↓
Intersection	7	33.3%	41.9%	-8.5% ↓
Pedestrian	0	0.0%	9.2%	-9.2% ↓
Motorcyclist	0	0.0%	17.7%	-17.7% ↓
Speeding	0	0.0%	18.6%	-18.6% ↓
Impaired	1	4.8%	26.3%	-21.5% ↓
Lane Departure	2	9.5%	45.5%	-35.9% ↓

Demographics

Age and sex of drivers involved in vehicle-train collisions

79% of the drivers involved in severe vehicle-train collisions were male.

Age	Male		Female		Other/Unknown		All Applicable Drivers	
<21	2	6%	1	3%	0	0%	3	9%
21 to 25	1	3%	0	0%	0	0%	1	3%
26 to 35	4	12%	0	0%	0	0%	4	12%
36 to 45	6	18%	0	0%	0	0%	6	18%
46 to 55	7	21%	0	0%	0	0%	7	21%
56 to 65	5	15%	1	3%	0	0%	6	18%
>65	1	3%	4	12%	0	0%	5	15%
Unknown	0	0%	0	0%	1	3%	1	3%
Total	26	79%	6	18%	1	3%	33	100%

When Crashes Occured (Seasonal Factors)

Time of day & time of year

Approximately half of these severe crashes occurred in winter months (January through March).

86% of severe vehicle-train collisions occurred during the day between 6:00 AM and 6:00 PM.

Light conditions

Light Condition	Severe Train Crashes	Percentage	All Severe Crashes
Daylight	18	86%	61%
Sunrise	0	0%	3%
Sunset	0	0%	3%
Night/Dark	3	14%	33%
Street Lights On	1	5%	14%
Street Lights Off	0	0%	1%
No Street Lights	2	10%	17%
Unknown Lighting	0	0%	1%
Other/Unknown	0	0%	1%

86% of severe vehicle-train collisions occurred in daylight conditions, compared to a lower 61% for all severe crashes.

Road surface conditions

Road Surface Condition	Severe Train Crashes	Percentage	All Severe Crashes
Dry	12	57%	78%
Wet	0	0%	9%
Snow/Slush/Ice	9	43%	11%
Mud/Debris	0	0%	<1%
Other	0	0%	2%

Adverse road surface conditions, specifically snow and ice, were present in a larger proportion of severe vehicle-train collisions than for all severe crashes.

Fatal and Serious Injury Crashes:

Work Zones

Fatal and serious injury crashes
103 severe crashes
21 severe crashes per year
1.5% of all severe crashes

Crashes of all severities
9,371 crashes
1,874 crashes per year
2.6% of all crashes

On Minnesota roadways, there were 103 severe crashes in work zones between 2008 and 2012. This is an average of 21 severe crashes per year and accounted for 1.5% of all severe crashes during the five-year period.

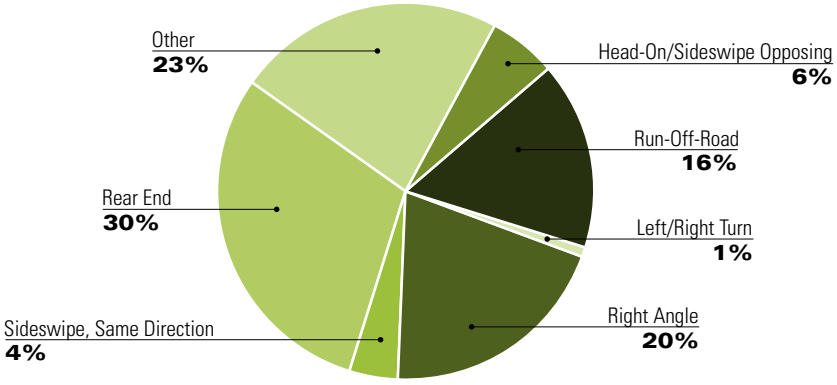
Statewide Crash Statistics

Jurisdiction and area type distribution of severe crashes involving work zones

	Rural		Urban		Other		Statewide	
State Trunk Highways	22	21%	42	41%	1	1%	65	63%
County Roads	11	11%	14	14%	1	1%	26	25%
City	0	0%	10	10%	1	1%	11	11%
Township	1	1%	0	0%	0	0%	1	1%
Other	0	0%	0	0%	0	0%	0	0%
All Jurisdictions	34	33%	66	64%	3	3%	103	100%

Severe crashes in work zones primarily occurred on the State system in urban areas (41%).

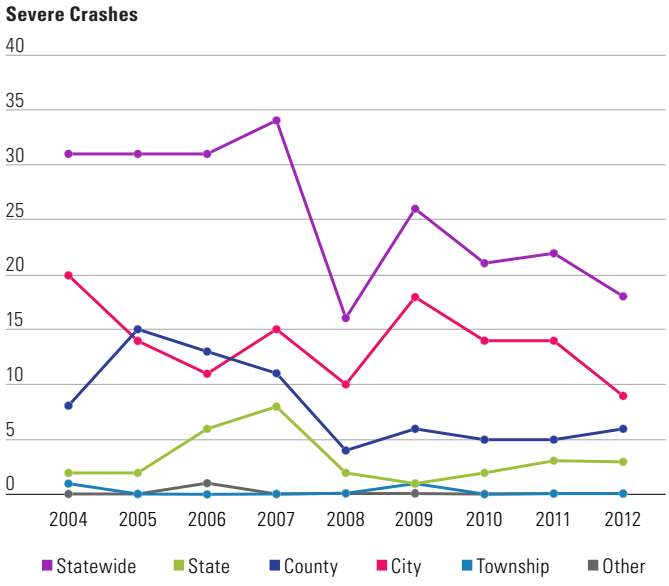
Crash Diagram Distribution



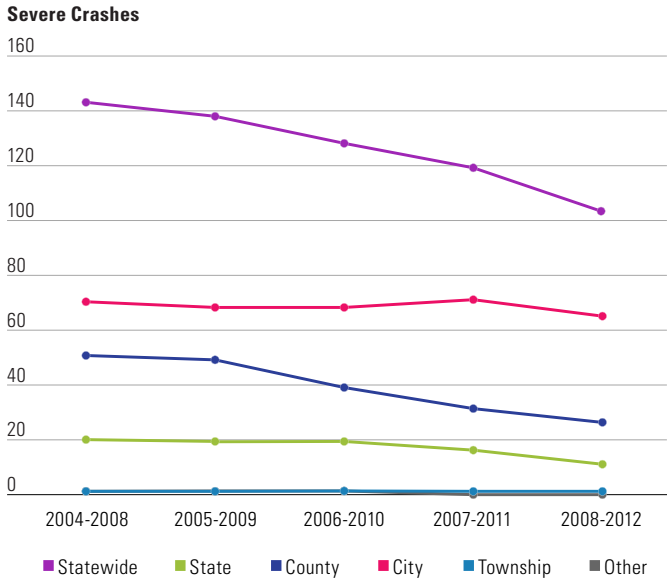
Rear-end (30%), right angle (20%), and run-off-road (16%) crashes account for the majority of severe crashes in work zones.

Trends

Severe crashes in work zones



Five year rolling total of severe crashes in work zones



Focus Areas

Interaction with other safety focus areas

An overrepresented 27% of severe crashes in work zones involved a commercial vehicle; it is unclear whether these commercial vehicles were passing through the work zone or were involved in the construction itself.

Inattentive and speeding drivers are over-represented for severe crashes in work zones.

12.6% of severe crashes in work zones involved a pedestrian.

Focus Area	Severe Crashes in Work Zones	Percentage of Crashes in Work Zones	Percentage of All Severe Crashes	Difference
Commercial Vehicle	28	27.2%	10.1%	+17.0% ↑
Inattentive	31	30.1%	18.7%	+11.4% ↑
Speeding	27	26.2%	18.6%	+7.6% ↑
Older	19	18.4%	14.6%	+3.8% —
Pedestrian	13	12.6%	9.2%	+3.4% —
Motorcycle	20	19.4%	17.7%	+1.7% —
Impaired	28	27.2%	26.3%	+0.9% —
Intersection	42	40.8%	41.9%	-1.1% —
Bicyclist	3	2.9%	4.1%	-1.2% —
Unlicensed	9	8.7%	10.0%	-1.2% —
Unbelted	30	29.1%	35.0%	-5.9% ↓
Younger	12	11.7%	19.4%	-7.8% ↓
Lane Departure	22	21.4%	45.5%	-24.1% ↓

Demographics

Age and sex of drivers involved in severe work zone crashes

63% of the drivers involved in severe crashes in work zones were male.

The ages of drivers involved in severe work zone crashes were distributed among all ages.

Age	Male		Female		Other/Unknown		All Applicable Drivers	
<21	24	8%	15	5%	0	0%	39	13%
21 to 25	27	9%	14	5%	0	0%	41	14%
26 to 35	36	12%	15	5%	1	<1%	52	17%
36 to 45	26	9%	15	5%	0	0%	41	14%
46 to 55	36	12%	16	5%	0	0%	52	17%
56 to 65	24	8%	9	3%	0	0%	33	11%
>65	15	5%	11	4%	0	0%	26	9%
Unknown	1	<1%	0	0%	13	4%	14	5%
Total	189	63%	95	32%	14	5%	298	100%

When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	0	0	0	0	1	1	2	5	1	2	0	0	12	12%
3:00 AM to 5:59 AM	0	0	2	0	1	2	0	2	2	2	0	0	11	11%
6:00 AM to 8:59 AM	1	1	1	2	1	1	1	1	2	2	0	1	14	14%
9:00 AM to 11:59 AM	0	0	1	2	2	1	1	0	3	0	3	0	13	13%
Noon to 2:59 PM	1	0	1	1	1	2	5	3	6	2	0	0	22	21%
3:00 PM to 5:59 PM	0	0	0	0	1	2	5	2	2	1	0	1	14	14%
6:00 PM to 8:59 PM	0	0	0	0	0	0	1	1	1	0	1	0	4	4%
9:00 PM to Midnight	0	1	0	0	1	1	1	2	4	2	1	0	13	13%
Total	2	2	5	5	8	10	16	16	21	11	5	2	103	100%
	2%	2%	5%	5%	8%	10%	16%	16%	20%	11%	5%	2%		

Severe crashes in work zones took place across all times of day, but were concentrated around the time of year conducive to construction work.

Light conditions

Light Condition	Severe Crashes in Work Zones	Percentage	All Severe Crashes
Daylight	63	61%	61%
Sunrise	3	3%	3%
Sunset	2	2%	3%
Night/Dark	35	34%	33%
Street Lights On	22	21%	14%
Street Lights Off	1	1%	1%
No Street Lights	11	11%	17%
Unknown Lighting	1	1%	1%
Other/Unknown	0	0%	1%

Generally following the percentages from all severe crashes, severe crashes in work zones were more likely to have incorporated street lights at night.

Road surface conditions

Road Surface Condition	Severe Crashes in Work Zones	Percentage	All Severe Crashes
Dry	86	83%	78%
Wet	8	9%	9%
Snow/Slush/Ice	4	4%	11%
Mud/Debris	1	1%	<1%
Other	3	3%	2%

Severe crashes in work zones were slightly more likely to occur on dry road surface conditions than all severe crashes.

Fatal and Serious Injury Crashes:

Unlicensed Drivers

Fatal and serious injury crashes
702 severe crashes
140 severe crashes per year
10% of all severe crashes

Crashes of all severities
20,444 crashes
4,089 crashes per year
5.7% of all crashes

On Minnesota roadways, there were 702 severe crashes involving an unlicensed driver between 2008 and 2012. This is an average of 140 severe crashes per year and accounted for 10% of all severe crashes during the five-year period.

Statewide Crash Statistics

Jurisdiction and area type distribution of severe unlicensed driver crashes

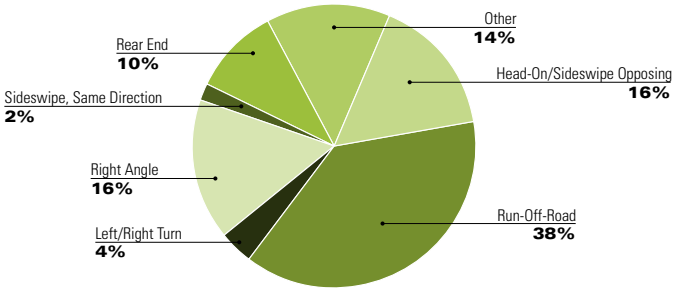
	Rural		Urban		Other		Statewide	
State Trunk Highways	171	24%	100	14%	1	<1%	272	39%
County Roads	137	20%	103	15%	8	1%	248	35%
City	6	1%	123	18%	7	1%	136	19%
Township	38	5%	0	0%	3	<1%	41	6%
Other	1	<1%	1	<1%	3	<1%	5	1%
All Jurisdictions	353	50%	327	47%	22	3%	702	100%

Severe crashes involving unlicensed drivers occurred prominently in both in rural (353 of 702; 50%) and urban (327 of 702; 47%).

In rural areas, crashes occurred on State (171 of 353; 48%) and County (137 of 353; 39%) roadway systems.

In urban areas, crashes occurred on both State (100 of 327; 31%) and Local (226 of 327; 69%) roadway systems.

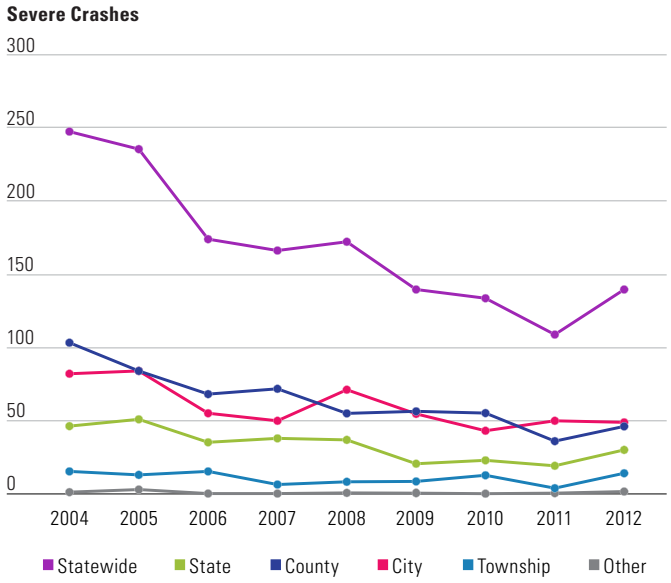
Crash diagram distribution



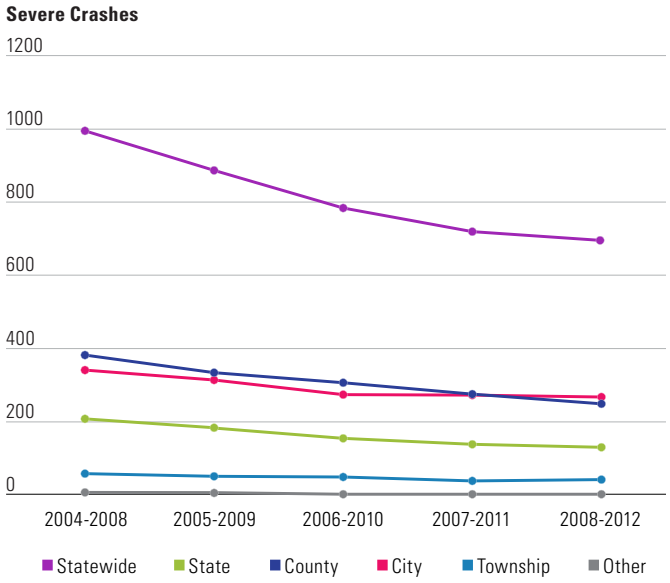
Run-off-road crashes were the most common crash type among severe crashes involving unlicensed drivers.

Trends

Severe crashes involving unlicensed drivers



Five year rolling total of severe crashes involving unlicensed drivers



Focus Areas

Interaction with other safety focus areas

Speeding and impaired drivers are over represented, factors in respectively 33% and 50% of severe crashes involving unlicensed drivers.

Older drivers and motorcyclists are underrepresented in severe unlicensed driver crashes.

Focus Area	Severe Unlicensed Driver Crashes	Percentage of Unlicensed Driver Crashes	All Severe Crashes	Difference
Impaired	350	49.9%	26.3%	+23.6% ↑
Unbelted	391	55.7%	35.0%	+20.7% ↑
Speeding	232	33.0%	18.6%	+14.4% ↑
Lane Departure	382	54.4%	45.5%	+8.9% ↑
Younger	126	17.9%	19.4%	-1.5% —
Commercial Vehicle	54	7.7%	10.1%	-2.5% —
Bicyclist	10	1.4%	4.1%	-2.6% —
Intersection	272	38.7%	41.9%	-3.1% —
Inattentive	107	15.2%	18.7%	-3.5% —
Pedestrian	38	5.4%	9.2%	-3.8% —
Motorcyclist	92	13.1%	17.7%	-4.6% —
Older	45	6.4%	14.6%	-8.2% ↓

Demographics

Age and sex of unlicensed drivers in severe crashes

78% of unlicensed drivers involved in severe crashes were male.

52% of unlicensed drivers involved in severe crashes were between the ages of 21 and 35.

Age	Male		Female		Other/Unknown		All Unlicensed Drivers	
<21	64	9%	38	5%	1	<1%	103	14%
21 to 25	120	17%	42	6%	0	0%	162	23%
26 to 35	169	24%	36	5%	1	<1%	206	29%
36 to 45	95	13%	22	3%	0	0%	117	16%
46 to 55	69	10%	11	2%	0	0%	80	12%
56 to 65	24	3%	6	1%	0	0%	30	4%
>65	14	2%	0	0%	0	0%	14	2%
Unknown	0	0%	0	0%	0	0%	0	0%
Total	555	78%	155	22%	2	<1%	712	100%

When Crashes Occured (Seasonal Factors)

Time of day & time of year

Time	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Midnight to 2:59 AM	5	3	9	9	9	17	19	9	8	13	10	12	123	18%
3:00 AM to 5:59 AM	1	3	2	4	3	6	2	6	6	6	7	2	48	7%
6:00 AM to 8:59 AM	2	4	9	1	0	3	5	8	6	9	4	5	56	8%
900 AM to 1159 AM	4	2	5	3	3	8	5	5	4	3	9	4	55	8%
Noon to 2:59 PM	8	7	6	7	13	19	13	10	8	9	11	11	122	18%
3:00 PM to 5:59 PM	5	3	8	10	8	12	12	19	14	11	11	12	125	18%
6:00 PM to 8:59 PM	0	6	4	4	8	5	12	12	1	4	10	5	71	10%
9:00 PM to Midnight	3	6	4	11	4	7	16	19	4	8	5	10	97	14%
Total	28	34	47	49	48	77	84	88	51	63	67	61	697	100%
	4%	5%	7%	7%	7%	11%	12%	13%	7%	9%	10%	9%		

36% of severe crashes involving unlicensed drivers occurred in the June through August timeframe.

The times of day at which these severe crashes occurred are well distributed, with 49% of severe crashes involving unlicensed drivers occurring between the hours of 6:00 PM and 6:00 AM.

*While there were a total of 702 severe crashes involving unlicensed drivers, the time of crash was unknown for five. Therefore, the total reflected in this table is 697.

Light conditions

Light Conditions	Severe Unlicensed Driver Crashes	Percentage	All Severe Crashes
Daylight	333	47%	61%
Sunrise	19	3%	3%
Sunset	16	2%	3%
Night/Dark	329	47%	33%
Street Lights On	152	22%	14%
Street Lights Off	6	1%	1%
No Street Lights	164	23%	17%
Unknown Lighting	7	1%	1%
Other/Unknown	5	1%	1%

Severe crashes involving unlicensed drivers were more likely to take place at night.

Road surface conditions

Road Surface Conditions	Severe Unlicensed Driver Crashes	Percentage	All Severe Crashes
Dry	569	81%	78%
Wet	71	10%	9%
Snow/Slush/Ice	54	8%	11%
Mud/Debris	1	<1%	<1%
Other	7	1%	2%

Appendix B: Strategies from other plans and stakeholders

This appendix presents a combined list of more than 500 traffic safety strategies that were identified during the development of this plan. Some are proven, while others have been tried with some success. Still others are considered experimental or are simply the ideas of passionate stakeholders stretching the limits of current thinking.

The list is grouped according to those strategies that were taken from other plans and those that were suggested by stakeholders. It is intended to be an initial reference point for anyone wishing to champion safety improvements. The strategies that were taken from other plans, particularly the Highway Safety Plan, are being implemented in Minnesota.

All of the strategies are categorized by the focus areas they are most relevant to. They are not presented by merit of effectiveness, cost or benefit. Rather, they are presented as a pool of ideas that may address crash problems within certain focus areas. Final selection of strategies should be done with careful consideration of the other information presented in this plan – crash data, trends, stakeholder perspectives, focus area priorities and an assessment of potential impacts.

These additional resources are also available to support the selection of traffic safety strategies.

NCHRP Report 500. Published by the National Cooperative Highway Research Program, the report identifies proven, tried and experimental strategies for specific focus areas. NCHRP Report 500 consists of a series of guides to designed assist state and local agencies in reducing injuries and fatalities in targeted areas. Each guide includes a brief introduction, a general description of the problem, the strategies to address the problem and a model implementation process. Available online at http://safety.transportation.org/guides.aspx.

Countermeasures That Work. Published by the National Highway Traffic Safety Administration, this is a basic reference to assist in the selection of effective, evidence-based countermeasures for traffic safety problem areas, particularly those that are behaviorally based. The guide describes major strategies and countermeasures; summarizes strategy use, effectiveness, costs and implementation time; and provides references to supporting research. Available online at: www.ghsa.org/html/publications/countermeasures.html.

Proven Safety Countermeasures. In January 2012, FHWA issued a "Guidance Memorandum on Promoting the Implementation of Proven Safety Countermeasures." This guidance takes into consideration the latest safety research to advance a group of countermeasures that have shown great effectiveness in improving safety. Safety practitioners are encouraged to consider this set of countermeasures that are research-proven, but not widely applied on a national basis. Further details are available online at: http://safety.fhwa.dot.gov/provencountermeasures/.

Appendix B: Strategies from other plans

Ref #	Strategy	Culture and Awareness	Intersections	Lane Departure	Unbelted	Impaired Drivers	Inattentive Drivers	Speed	Older Drivers	Younger Drivers	Motorcycles	Pedestrians	EMS and Trauma Systems	Data Management	Management Systems	Bicyclists	Commercial Vehicles	Trains	Work Zones	Unlicensed Drivers	Vehicle Safety Enhancements	Other Plan Source
352	Education about and promotion of protective safety behaviors: wearing seat belts, using appropriate child passenger restraints, drinking and driving, medications and driving, inattention and driving, etc.	x			x	x	x															Minnesota Trauma System Performance Improvement Plan
481	Paid media related to seat belts, child seats, speeding, distracted driving and other identified problems	x			x		x	x														Highway Safety Plan (Federal Fiscal Year 2014)
437	"Conduct highly publicized enforcement campaigns to maximize restraint use; specifically, night time belt enforcement saturation"	x			x																	County Road Safety Plans-Otter Tail County (Example)
439	Conduct high-profile "child restraint inspection" events at multiple community locations	x			x																	County Road Safety Plans-Otter Tail County (Example)
463	Support for outreach and education disseminated to the public and traffic safety partners regarding the safe transportation of children	x			x																	Highway Safety Plan (Federal Fiscal Year 2014)
310	ROCOG and its partner agencies should continue to participate in joint efforts such as Safe and Sober, Operation NightCap, HEAT, and other initiatives targeted as reducing impaired driving, addressing aggressive and distracted driving, and education and training targeted at younger and older drivers	x				x	x	x	x	x												MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
429	Support community programs for alternative transportation (after drinking)	x				x																County Road Safety Plans-Otter Tail County (Example)
430	Conduct regular well-publicized DWI saturations	x				x																County Road Safety Plans-Otter Tail County (Example)
431	Conduct education and awareness campaign of the targeted enforcement of Zero Tolerance Laws for Drivers Under Age 21	x				x																County Road Safety Plans-Otter Tail County (Example)
457	Provide print and electronic materials on impaired-related traffic safety issues, as well as media relations services	x				x																Highway Safety Plan (Federal Fiscal Year 2014)
465	Fund Patrol work and media relations related to the TZD days devoted to enforcing speed, distracted and aggressive driving and the move over law	x					x	x														Highway Safety Plan (Federal Fiscal Year 2014)

Ref #	Strategy	Culture and Awareness	Intersections	Lane Departure	Unbelted	Impaired Drivers	Inattentive Drivers	Speed	Older Drivers	Younger Drivers	Motorcycles	Pedestrians	EMS and Trauma Systems	Data Management	Management Systems	Bicyclists	Commercial Vehicles	Trains	Work Zones	Unlicensed Drivers	Vehicle Safety Enhancements	Other Plan Source
460	Develop statewide news releases and events on distracted driving and provide packetsof sample releases, fact sheets, and ideas for events for local partners to publicize distracted driving enforcement	x					x															Highway Safety Plan (Federal Fiscal Year 2014)
461	Coordinate paid media on distracted driving	x					x															Highway Safety Plan (Federal Fiscal Year 2014)
512	Use Preemption on Vehicle Radios to Provide Real-Time Information	x					x															ITS Planning and Regional Architecture 2014; Volume 9
441	Publicize and conduct high visibility targeted enforcement of speeding and aggressive driving	x						x														County Road Safety Plans-Otter Tail County (Example)
508	Use Driving Simulation for Teenage and Older Driver Education	x							x	x												ITS Planning and Regional Architecture 2014; Volume 9
260	Support increased driver education efforts	x							x	x												MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
424	Publicize and conduct a high visibility enforcement Graduated Drivers License restrictions, underage drinking and driving and seatbelt laws	x								x												County Road Safety Plans-Otter Tail County (Example)
338	Education efforts should focus on building awareness through measures such as safety campaigns in the media, curriculum content within schools and driver education classes, and making information available through venues such as websites or public access television	x								x												MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
443	Publicize and conduct a high visibility enforcement of all laws pertaining to motorcycle riding	x									x											County Road Safety Plans-Otter Tail County (Example)
467	Provide for a motorcycle safety campaign, public information and education activities, and media relations	x									x											Highway Safety Plan (Federal Fiscal Year 2014)
590	The Council encourages educational and promotional programs to increase awareness of and respect for the rights of pedestrians and bicyclists by motorists and to educate bicyclists on the proper and safe use of public roadways.	x										x				x						MTP: 2030 Transportation Policy Plan-Metropolitan Council
294	LAPC staff and Bicycle and Pedestrian Advisory Committee (BPAC) members educating the public at local events (i.e. Earth Day, Bike to Work Week, conferences)	x										x				x						MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
300	LAPC staff and BPAC members provide educational materials on walking and biking at display booths at local events	x										x				x						MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan

Ref #	Strategy	Culture and Awareness	Intersections	Lane Departure	Unbelted	Impaired Drivers	Inattentive Drivers	Speed	Older Drivers	Younger Drivers	Motorcycles	Pedestrians	EMS and Trauma Systems	Data Management	Management Systems	Bicyclists	Commercial Vehicles	Trains	Work Zones	Unlicensed Drivers	Vehicle Safety Enhancements	Other Plan Source
237	Promote local pedestrian and bicycle safety education (e.g. "Share the Road" initiative)	x										x				x						MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
339	Each locality, in conjunction with its law enforcement agencies, should decide to what extent cyclist and pedestrian rights and responsibilities should be enforced	x										x				x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
340	Local law enforcement agencies should implement or continue to use non-motorized modes to help accomplish law enforcement goals, such as implementing bicycle patrols in appropriate areas	x										x				x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
479	Fund additional enforcement and education/awareness of pedestrian laws on college campuses and in populous cities	x										x										Highway Safety Plan (Federal Fiscal Year 2014)
270	Create & distribute safety brochure on key safety issues and crash facts.	x												x								MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
271	Update APO website to include interactive map with safety data.	x												x								MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
274	Work with Mn/DOT, area jurisdictions and local law enforcement to determine safety issues and deficiencies on transportation system.	x												x								MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
275	Provide resources such as mapping and crash data to local law enforcement to address and monitor problematic locations.	x												x								MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
278	Map and distribute crash rate and severities for APO planning area.	x												x								MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
221	Develop and share critical safety information and support educational initiatives	x												x								Statewide Multimodal Transportation Plan
265	Identify funding for bike/motorist education effort	x														x						MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
286	Coordinate with Metro Bus on review and implementation of Safety Management Program.	x															x					MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
386	Support the TZD initiative and its comprehensive approach toward highway safety	x																				20-Year State Highway Investment Plan (MnSHIP)
438	Encourage employers to 1) offer education programs to employees and to 2) enact traffic safety policies with clear consequences for failure to comply	x																				County Road Safety Plans-Otter Tail County (Example)
480	Provide print and electronic materials on traffic safety issues, as well as media relations services	x																				Highway Safety Plan (Federal Fiscal Year 2014)

Ref #	Strategy	Culture and Awareness	Intersections	Lane Departure	Unbelted	Impaired Drivers	Inattentive Drivers	Speed	Older Drivers	Younger Drivers	Motorcycles	Pedestrians	EMS and Trauma Systems	Data Management	Management Systems	Bicyclists	Commercial Vehicles	Trains	Work Zones	Unlicensed Drivers	Vehicle Safety Enhancements	Other Plan Source
485	Identify and holistically promote traffic safety legislation	x																				Minnesota State Patrol 2013-16 Strategic Plan
488	Collaborate with allied agencies on efforts aimed at reducing crashes on all roadways	x																				Minnesota State Patrol 2013-16 Strategic Plan
489	Educate the public on the benefits of traffic safety as well as the negative impacts associated with traffic related incidents	x																				Minnesota State Patrol 2013-16 Strategic Plan
292	LAPC staff attending Highway Safety Commission (HSC) meetings.	x																				MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
295	Retaining a liaison from the La Crosse Police Department on the BPAC	x																				MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
235	Assist regional initiatives to increase safety education and enforcement efforts(e.g. Towards Zero Deaths, MN Safe Communities Coalition)	x																				MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
309	Local roadway, law enforcement, emergency response and public health agencies should continue involvement in the Southeast Minnesota Regional TZD Partnership	x																				MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
313	Create a website dedicated to regional transportation safety that incorporates links to the regional safety reports and plans, current safety initiatives, news links, and contact information	x																				MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
314	Continue to make safety education and outreach a top priority	x																				MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
269	Create Safety Committee (Traffic Advisory Committee) to oversee APO planning area safety issues.	x																				MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
272	Put together and distribute safety specific survey to determine unidentified safety needs.	x																				MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
273	Present existing and new safety information and technologies to APO committees, area jurisdictions and interested stakeholders.	x																				MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
279	Encourage use of APO access management guidelines, ITS, and TDM strategies.	x																				MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
220	Increase participation of all road authorities in the collaborative safety initiative TZD and explore new opportunities to work together to improve safety for all modes	x																				Statewide Multimodal Transportation Plan
222	Collaborate with law enforcement to promote compliance with traffic laws, affect driver behavior, and reduce unsafe driving practices for all modes	x																				Statewide Multimodal Transportation Plan

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575	In-Pavement LEDs		x	x			x															ITS Planning and Regional Architecture 2014; Volume 9
534	Instrument Local Roads		x	x				x														ITS Planning and Regional Architecture 2014; Volume 9
230	Coordinate roadway improvements to enhance evacuation plans		x	x									x		x							MTP: Grand Forks/East Grand Forks 2035 Long Range Transportation Plan
231	Coordinate emergency, evacuation plans with flood control operations		x	x									x		x							MTP: Grand Forks/East Grand Forks 2035 Long Range Transportation Plan
535	Sharing CCTV Images Between Agencies		x	x									x									ITS Planning and Regional Architecture 2014; Volume 9
536	Expand CCTV Surveillance at High Incident Locations		x	x									x									ITS Planning and Regional Architecture 2014; Volume 9
537	ITS and Communications Coordination and Information Sharing		x	x									x									ITS Planning and Regional Architecture 2014; Volume 9
229	Develop emergency, evacuation and security plans		x	x									x									MTP: Grand Forks/East Grand Forks 2035 Long Range Transportation Plan
232	Use crash data to identify problematic locations - recommend appropriate improvements		x	x										x	x							MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
233	Conduct regular TSM (Transportation Systems Management)assessment of network –maintain database		x	x										x	x							MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
234	Conduct safety reviews as part of project reviews		x	x											x							MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
236	Include bicycle and pedestrian analsyese during TSM assessments		x	x											x							MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
321	Review all preservation projects to identify opportunities for proactively incorporating low-cost safety improvements		x	x											x							MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
322	Consider the incorporation of low cost engineering improvements in all reconstruction and improvement projects to improve roadway safety, focused on reducing and separating vehicle conflicts, reducing crash severity, and improving guidance and communication to drivers to reduce driver error		x	x											x							MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
495	Enhance Traveler Information Map for Mobile Devices		x	x																		ITS Planning and Regional Architecture 2014; Volume 9
496	511 Telephone Interface Upgrade		x	x																		ITS Planning and Regional Architecture 2014; Volume 9
500	Arterial Traffic Management Systems		x	x																		ITS Planning and Regional Architecture 2014; Volume 9

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515	CCTV Cameras at RWIS Sites		x	x																		ITS Planning and Regional Architecture 2014; Volume 9
533	511 Expansion to Local Roads		x	x																		ITS Planning and Regional Architecture 2014; Volume 9
579	Roadway Condition and Environmental Sensors on Maintenance Vehicles for Traveler Information		x	x																		ITS Planning and Regional Architecture 2014; Volume 9
585	Local and county governments shall plan a system of multimodal interconnected collector roads and minor arterials to serve short and medium-length trips. Unless cities and counties plan an interconnected system of local streets, collectors and minor arterials, motor vehicles have to use streets that do not match the appropriate function. Traffic can be forced to use local streets to move from one neighborhood to another or to commercial nodes, increasing safety problems.		x	x																		MTP: 2030 Transportation Policy Plan-Metropolitan Council
586	Mn/DOT should regularly review planned preservation and maintenance projects to determine if there are opportunities to include lower-cost congestion mitigation and safety improvements. The existing process to identify opportunities to integrate preservation projects with congestion mitigation and safety projects is more important than ever. A similar approach should be used by cities and counties as they undertake local highway projects.		x	x																		MTP: 2030 Transportation Policy Plan-Metropolitan Council
587	State, county and local governments will manage access to the Regional Highway System. The capacity, safety and utility of principal and "A" minor arterials are dictated in large part by how access to these roadways is provided and managed. Managing the location and design and new or reconstructed street and driveway connections to these arterials is a key strategy to preserve the existing capacity and enhance the safety of these roadways.		x	x																		MTP: 2030 Transportation Policy Plan-Metropolitan Council
298	Encourage planning, engineering, and public works departments to adopt design standards that reduce the need for traffic enforcement		x	x																		MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
228	Roadway improvements and safety planning does not conflict with SHSP		x	x																		MTP: Grand Forks/East Grand Forks 2035 Long Range Transportation Plan

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281	Support additional ITS infrastructure improvements.		x	x																		MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
224	Ensure that transportation facilities are planned, engineered, operated, and maintained with consideration for the safety of all users		x	x																		Statewide Multimodal Transportation Plan
225	Implement strategic and sustainable engineering solutions to improve traveler safety		x	x																		Statewide Multimodal Transportation Plan
423	Provide traffic calming on intersection approaches through a combination of geometrics and traffic control devices		x					x														County Road Safety Plans-Otter Tail County (Example)
337	Data on crashes involving bicyclists, pedestrians and autos should be monitored on a routine basis to determine where needs may exist for better signing, lighting or traffic control, for education initiatives targeted to users of the area, or for new facilities to reduce risks to bicyclists and pedestrians. An on-going study program involving completion of Road Safety Audits or Intersection Safety Audits should be considered to provide the level of detailed study needed to evaluate the significance of risks at high crash locations. Initial efforts should be focused on downtown Rochester due to the high incidence of crashes involving pedestrians and bicyclists in the core area.		x									x		x	x	x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
588	Recognizing the importance of walking and bicycling to a multimodal transportation system, the Council will strongly encourage local units of government to develop a safe and attractive pedestrian environment near major transit corridors and stations with linkages for pedestrians and bicyclists from origins and destinations to buses and trains.		x									x				x	x					MTP: 2030 Transportation Policy Plan-Metropolitan Council
401	Improve operation of pedestrian and bicycle facilities at signalized intersections		x									x				x						County Road Safety Plans-Otter Tail County (Example)
589	Local and state agencies should implement a multimodal roadway system and should explicitly consider providing facilities for pedestrians and bicyclists in the design and planning stage of principal or minor arterial road construction and reconstruction projects with special emphasis placed on travel barrier removal and safety for bicyclists and pedestrians in the travel corridor.		x									x				x						MTP: 2030 Transportation Policy Plan-Metropolitan Council

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304	Encourage municipal engineering and public works departments to adopt the ITE guide, "Context-Sensitive Solutions for Major Urban Thoroughfares in Walkable Communities"		x									x										MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
250	Install pedestrian countdown timers		x									x										MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
319	Continue to implement access management requirements at the site development level as well as through corridor studies, particularly on critical Principal Arterial corridors		x												x							MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
264	Encourage and support education efforts for both bicyclists and motorists regarding interaction and proper protocol on local roadways		x													x						MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
547	Additional Installation of Highway Rail Intersection (HRI) Monitoring Equipment		x															x				ITS Planning and Regional Architecture 2014; Volume 9
1	Implement state-of-the-art traffic control and safety systems to ensure a safe and efficient rail system on key arterials		x															x				Minnesota Comprehensive Statewide Freight and Passenger Rail Plan
291	Identify and invest in uncontrolled or problematic rail crossings where crashes may have or have occurred.		x															x				MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
388	Install lighting only at highest-risk sustained crash locations		x																			20-Year State Highway Investment Plan (MnSHIP)
398	Optimize signal operation (phasing/ timing, etc.)		x																			County Road Safety Plans-Otter Tail County (Example)
399	Optimize clearance intervals at signals		x																			County Road Safety Plans-Otter Tail County (Example)
400	Employ signal coordination along a corridor or route		x																			County Road Safety Plans-Otter Tail County (Example)
402	Remove unwarranted/unnecessary signals		x																			County Road Safety Plans-Otter Tail County (Example)
403	Improve visibility of signals and signs at intersections		x																			County Road Safety Plans-Otter Tail County (Example)
404	Supplement conventional enforcement of red-light running with confirmation lights		x																			County Road Safety Plans-Otter Tail County (Example)
405	Restrict access to properties using driveway closures or turn restriction		x																			County Road Safety Plans-Otter Tail County (Example)
406	Restrict cross-median access near intersections		x																			County Road Safety Plans-Otter Tail County (Example)
407	Restrict or eliminate parking on intersection approaches		x																			County Road Safety Plans-Otter Tail County (Example)

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408	Implement driveway closure/ relocations		x																			County Road Safety Plans-Otter Tail County (Example)
409	Implement driveway turn restrictions		x																			County Road Safety Plans-Otter Tail County (Example)
410	Restrict or eliminate turning maneuvers by providing channelization or closing median openings		x																			County Road Safety Plans-Otter Tail County (Example)
411	Close or relocate "high-risk" intersections		x																			County Road Safety Plans-Otter Tail County (Example)
412	Realign intersection approaches to reduce or eliminate intersection skew		x																			County Road Safety Plans-Otter Tail County (Example)
413	Use indirect left-turn treatments to minimize conflicts at divided highway intersections		x																			County Road Safety Plans-Otter Tail County (Example)
414	Clear sight triangle on stop- or yield-controlled approaches to intersections		x																			County Road Safety Plans-Otter Tail County (Example)
415	Provide an automated real-time system to inform drivers of suitability of available gaps for making turning and crossing maneuvers		x																			County Road Safety Plans-Otter Tail County (Example)
416	Improve visibility of intersections by providing enhanced signing and delineation		x																			County Road Safety Plans-Otter Tail County (Example)
417	Improve visibility of intersections by providing lighting		x																			County Road Safety Plans-Otter Tail County (Example)
418	Install splitter islands on the minor-road approach to an intersection		x																			County Road Safety Plans-Otter Tail County (Example)
419	Provide a stop bar (or provide a wider stop bar) on minor-road approaches		x																			County Road Safety Plans-Otter Tail County (Example)
420	Call attention to the intersection by installing rumble strips on intersection approaches		x																			County Road Safety Plans-Otter Tail County (Example)
421	Provide roundabouts at appropriate locations		x																			County Road Safety Plans-Otter Tail County (Example)
449	Deploy conflict warning systems at intersections with a high number of serious crashes.		x																			Highway Safety Plan (Federal Fiscal Year 2014)
451	Construct reduced conflict intersections		x																			Highway Safety Plan (Federal Fiscal Year 2014)
499	Advance Warning Flasher Deployment Expansion		x																			ITS Planning and Regional Architecture 2014; Volume 9
505	Implement Automated Enforcement of Red Light Running at Intersections		x																			ITS Planning and Regional Architecture 2014; Volume 9

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523	Rural Intersection Conflict Warning Systems (RICWS)		x																			ITS Planning and Regional Architecture 2014; Volume 9
546	Signal Phase Transition Systems		x																			ITS Planning and Regional Architecture 2014; Volume 9
248	Require adequate building setbacks in land-use and zoning policies for corner lots to maintain adequate sight distances		x																			MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
249	Consider all intersection design options, including three-quarter access and roundabouts		x																			MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
316	Create a partnership with law enforcement agencies to facilitate red-light running enforcement through signal confirmation lights as recommended in the Olmsted County Safety Plan		x																			MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
320	Reduce frequency and severity of intersection conflicts through traffic signal coordination and operational improvements		x																			MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
276	Work with local law enforcement to determine optimal signalized intersection for installation of monitoring cameras.		x																			MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
277	Better utilize TSM report for monitoring and implementation of intersection safety improvements.		x																			MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
280	Identify and invest in both lower cost and higher cost safety improvements such as turn lanes, medians, and intersection controls on urban roads in APO planning area.		x																			MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
290	Recommend optimization of entire metropolitan signal system.		x																			MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
529	Congestion Information Expanded to Selected Greater Minnesota Locations			x				x														ITS Planning and Regional Architecture 2014; Volume 9
530	Traffic Flow Maps for Key Arterials			x				x														ITS Planning and Regional Architecture 2014; Volume 9
532	Traffic Flow Maps for Key Corridors			x				x														ITS Planning and Regional Architecture 2014; Volume 9
543	Curve Speed Warning Systems			x				x														ITS Planning and Regional Architecture 2014; Volume 9
568	Provide Real-Time Information to Equipped Vehicles That Deliver Warnings to Drivers			x				x														ITS Planning and Regional Architecture 2014; Volume 9
261	Design roadways to be self-regulating (especially for speed) to the maximum extent possible			x				x														MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area

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552	Transit Vehicle Lateral Safety Detection and Warning Systems			x								x				x						ITS Planning and Regional Architecture 2014; Volume 9
573	Use Agency Vehicles as Data Probes			x										x	x							ITS Planning and Regional Architecture 2014; Volume 9
545	Overheight Detection/Warning Systems			x													x					ITS Planning and Regional Architecture 2014; Volume 9
389	Install shoulder rumble strips			x																		County Road Safety Plans-Otter Tail County (Example)
390	Install enhanced pavement markings, edgeline rumble strips or modified shoulder rumble strips on section with narrow or no paved shoulders			x																		County Road Safety Plans-Otter Tail County (Example)
391	Install centerline rumble strips			x																		County Road Safety Plans-Otter Tail County (Example)
392	Provide enhanced shoulder or delineation and marking for sharp curves			x																		County Road Safety Plans-Otter Tail County (Example)
393	Provide improved highway geometry for horizontal curves			x																		County Road Safety Plans-Otter Tail County (Example)
394	Apply shoulder treatments: eliminate shoulder drop-offs; shoulder edge; widen and/or pave shoulders			x																		County Road Safety Plans-Otter Tail County (Example)
395	Install centerline rumble strips for two-lane roads			x																		County Road Safety Plans-Otter Tail County (Example)
396	Design safer slopes and ditches to prevent rollovers			x																		County Road Safety Plans-Otter Tail County (Example)
397	Remove/relocate objects in hazardous locations			x																		County Road Safety Plans-Otter Tail County (Example)
450	Identify trunk highway sections in need of cable median barriers to prevent and/or reduce the incidence of cross over median crashes.			x																		Highway Safety Plan (Federal Fiscal Year 2014)
502	Metro Area Ramp Meter Expansion and Enhancements			x																		ITS Planning and Regional Architecture 2014; Volume 9
507	Expand Geographic Coverage of the RTMC Systems			x																		ITS Planning and Regional Architecture 2014; Volume 9
513	Expand Maintenance and Decision Support System (MDSS) Deployment			x																		ITS Planning and Regional Architecture 2014; Volume 9
518	Continue Roadway Automated Treatment System Deployment			x																		ITS Planning and Regional Architecture 2014; Volume 9
526	CARS Integration Across State Borders			x																		ITS Planning and Regional Architecture 2014; Volume 9

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527	ITS Communications Interstate Connectivity			x																		ITS Planning and Regional Architecture 2014; Volume 9
528	CARS ITS Data Addition			x																		ITS Planning and Regional Architecture 2014; Volume 9
542	Automated/Remote Operated Gate Systems			x																		ITS Planning and Regional Architecture 2014; Volume 9
544	Flood Warning Systems			x																		ITS Planning and Regional Architecture 2014; Volume 9
550	Snowplow Maintenance Activity Alerts Using DMS			x																		ITS Planning and Regional Architecture 2014; Volume 9
570	Implement Improved Lane Guidance System			x																		ITS Planning and Regional Architecture 2014; Volume 9
572	Route-specific Weather Information			x																		ITS Planning and Regional Architecture 2014; Volume 9
251	Consider safety options like rumble strips, rumble stripes, and cable barriers and install as appropriate			x																		MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
252	Minimize or eliminate skewing of lanes			x																		MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
253	Establish consistency with metropolitan access management guidelines			x																		MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
482	Align organizational efforts to aggressively enforce seat belt, DWI, aggressive driving, and other violations that directly contribute to fatal and injury crashes				x	x		x														Minnesota State Patrol 2013-16 Strategic Plan
483	Expand the use of directed patrol and saturation efforts				x	x		x														Minnesota State Patrol 2013-16 Strategic Plan
258	Support law enforcement efforts to decrease crash rates, such as sobriety check points, seat belt use encouragement, and speed enforcement.				x	x		x														MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
315	Provide needed support for law enforcement initiatives to reduce speeding, improve seat belt compliance and reduce drinking and driving				x	x		x														MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
351	Promote a culture of safety and encourage providers to adopt protective safety measures such as using seatbelts and driving safely				x								x									Minnesota Trauma System Performance Improvement Plan
440	Train advocates to check for proper child restraint use				x																	County Road Safety Plans-Otter Tail County (Example)

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462	Provide for increased enforcement of the seat belt law during October, March and over Memorial Day for the Minnesota State Patrol as well as all other enforcement agencies				x																	Highway Safety Plan (Federal Fiscal Year 2014)
464	Maintain grant program that allows local agencies to order and distribute (to low-income families) child restraints for which lower than usual prices have been obtained under a state purchasing contract				x																	Highway Safety Plan (Federal Fiscal Year 2014)
567	Require Seatbelt Ignition Interlocks on New Vehicles				x																	ITS Planning and Regional Architecture 2014; Volume 9
487	Move organizational culture toward zero tolerance on seat belt violations with an emphasis on citations to increase compliance				x																	Minnesota State Patrol 2013-16 Strategic Plan
444	Target law enforcement to specific motorcycle rider impairment behaviors that have been shown to contribute to crashes					x					x											County Road Safety Plans-Otter Tail County (Example)
427	Require Responsible Beverage Service policies for alcohol servers and retailers					x																County Road Safety Plans-Otter Tail County (Example)
428	Employ screeing and brief interventions for impaired driving					x																County Road Safety Plans-Otter Tail County (Example)
432	Suspend driver's license adminitsrately upon arrest					x																County Road Safety Plans-Otter Tail County (Example)
433	Eliminate diversion programs and plea bargains for impaired driving					x																County Road Safety Plans-Otter Tail County (Example)
434	Require ignition interlocks as a condition for licent reinstatement					x																County Road Safety Plans-Otter Tail County (Example)
435	Monitor convicted DWI offenders closely					x																County Road Safety Plans-Otter Tail County (Example)
436	Include strong sentence guidelines that are enforced for impaired driving					x																County Road Safety Plans-Otter Tail County (Example)

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452	DWI offenders are able to request a judicial review to contest the administrative revocation of their driving privileges. Minnesota is one of the few states that conduct these hearings in a district court setting, which is costly and time consuming. Assuming legislation will allow, this project will fund a pilot project that will transfer the jurisdiction for these hearings to the Office of Administrative Hearings. New technologies, such as interactive television (ITV) will be used to determine cost and time savings. A law change is required prior to starting this project.					x																Highway Safety Plan (Federal Fiscal Year 2014)
453	DWI offenders will be screened to determine level of chemical use and triaged to determine level of recommended care (intervention)					x																Highway Safety Plan (Federal Fiscal Year 2014)
454	Implement an ignition interlock program in cooperation with judges who aree to order the devices for offenders and coordinate with current administrative ignition interlock program at Driver and Vehicle Services					x																Highway Safety Plan (Federal Fiscal Year 2014)
455	Implement overtime and on-duty enforcement program that funds impaired driving saturations on a regular basis in targeted areas and during targeted holiday weekends					x																Highway Safety Plan (Federal Fiscal Year 2014)
456	Support judicial leadership in the development of DWI Courts for repeat DWI offenders					x																Highway Safety Plan (Federal Fiscal Year 2014)
458	Provide technical assistance for communities that have a desire to start an alternative transportation programs (e.g. Joyride) for impaired drivers					x																Highway Safety Plan (Federal Fiscal Year 2014)
471	Continue deployment of system that allows officers to electronically file all forms required for administrative and criminal actions against DWI offenders					x																Highway Safety Plan (Federal Fiscal Year 2014)
493	Implement and utilize DWI e-charging in every district by the end of 2014					x																Minnesota State Patrol 2013-16 Strategic Plan
548	Queue Length at Ramps, Incident and Work Zones						x	x											x			ITS Planning and Regional Architecture 2014; Volume 9
569	Research Equipping Vehicles with Systems to Detect Driver Distractions and Provide Warnings						x														x	ITS Planning and Regional Architecture 2014; Volume 9
459	Increase distracted driving enforcement period from a day to a week in April						x															Highway Safety Plan (Federal Fiscal Year 2014)

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259	Support restriction of cell phone use by drivers						x															MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
341	"Traffic calming" has grown in popularity as a way to slow motorists, reduce cut-through traffic, reduce the impact of collisions and improve the roadway corridor environment for bicyclists and pedestrians in residential areas. Consideration of traffic calming improvements is usually managed through development of a neighborhood traffic management plan (NTMP). All NTMP efforts should include consideration of improvement needs for bicycle and pedestrians during the plan development process							x				x				x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
514	Dynamic Speed in Work Zones to Advise Drivers							x											x			ITS Planning and Regional Architecture 2014; Volume 9
517	Portable Queue Detection and Stopped Traffic Advisory							x											x			ITS Planning and Regional Architecture 2014; Volume 9
520	Expand IWZ Deployment to Greater Minnesota							x											x			ITS Planning and Regional Architecture 2014; Volume 9
522	Portable Work Zone Dynamic Speed Display Signs							x											x			ITS Planning and Regional Architecture 2014; Volume 9
422	Provide targeted speed enforcement							x														County Road Safety Plans-Otter Tail County (Example)
442	Impose sanctions against repeat offenders of aggressive driving							x														County Road Safety Plans-Otter Tail County (Example)
498	Dynamic Speed Display Signs ("Your Speed Is")							x														ITS Planning and Regional Architecture 2014; Volume 9
501	Dynamic Lane Control and Variable Speed Limit Signs on Freeways							x														ITS Planning and Regional Architecture 2014; Volume 9
503	Travel Time Freeway Sign Expansion							x														ITS Planning and Regional Architecture 2014; Volume 9
551	Detectors for Speed Data Collection at High Incident Locations							x														ITS Planning and Regional Architecture 2014; Volume 9
574	Automated Speed Enforcement							x														ITS Planning and Regional Architecture 2014; Volume 9
577	Enhanced Speed Monitoring Equipment for Work Zones							x														ITS Planning and Regional Architecture 2014; Volume 9

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296	Encourage communities and Departments of Transportation (DOTs) to incorporate traffic calming measures into their road projects							x														MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
333	Continue to work with City of Rochester on implementation of traffic calming measures							x														MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
325	ROCOG and its partners should consider establishing a Safe Routes for Seniors program to address special concerns association with travel of seniors in areas where concentration of senior populations area found								x			x										MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
470	Train doctors and their staff on what to look for and tests to conduct to identify drivers whose physical or mental condition indicate they should take positive steps to improve their ability to drive stop driving soon								x													Highway Safety Plan (Federal Fiscal Year 2014)
335	ROCOG should work with local governments to explore the adoption of land use policies and guidelines that foster alternative transportation choices								x													MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
425	Engage parents through outreach programs designed to educate parents about driving tips for their teens, facilitate parental supervision and management of young drivers, encourage selection of safety vehicles for young drivers									x												County Road Safety Plans-Otter Tail County (Example)
469	Promote and support further implementation of community-involved parental education classes through driver education programs									x												Highway Safety Plan (Federal Fiscal Year 2014)
524	In-Vehicle Monitoring of Teenage Drivers in Graduated Drdiver Licensing Program									x												ITS Planning and Regional Architecture 2014; Volume 9
445	Ensure that licensing and rider training programs adequately teach and measure skills and behaviors required for crash avoidance										x											County Road Safety Plans-Otter Tail County (Example)
446	Identify and remove barriers to obtaining a motorcycle endorsement										x											County Road Safety Plans-Otter Tail County (Example)
447	Increase the awareness of the benefit of high-visibility clothing										x											County Road Safety Plans-Otter Tail County (Example)
448	Increase the use of FMVSS 218 compliant helmets										x											County Road Safety Plans-Otter Tail County (Example)
466	Provide for classroom and training range facilities and 180 RiderCoaches for basic, experienced, skills re-test, moped and civilian police motorcycle courses										x											Highway Safety Plan (Federal Fiscal Year 2014)

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468	Conduct evening hours motorcycle skills testing and provide for the training, testing, and auditing of RiderCoaches operating as third party testers for the MMSP										x											Highway Safety Plan (Federal Fiscal Year 2014)
591	Corridor planning and design must incorporate the mobility and safety needs of all users including freight vehicles, transit vehicles, pedestrians and bicycles.											x				x	x					MTP: 2030 Transportation Policy Plan-Metropolitan Council
246	Promote roadway designs that improve the pedestrians, cyclist and railroad crossings											x				x		x				MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
257	Support a higher measure of safety for (bike/ped) corridors that cross major barriers like rivers, interstate highways, and railroad tracks											x				x		x				MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
553	Pedestrian and Bicycle Detection with Advance Warning for Drivers											x				x						ITS Planning and Regional Architecture 2014; Volume 9
592	Traffic calming measures on collector and local roads can reduce vehicular speeds to improve bicycle and pedestrian safety.											x				x						MTP: 2030 Transportation Policy Plan-Metropolitan Council
593	Improvements for bicycle and pedestrian safety and mobility should be made on "B" minor arterials if there are no other options and on "A" minor arterials so long as they do not diminish the capability for multimodal function and capacity.											x				x						MTP: 2030 Transportation Policy Plan-Metropolitan Council
297	Adopt a Complete Streets Policy (La Crosse County and MPO member communities)											x				x						MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
301	LAPC staff assists the Safe Routes to School (SRTS) Coordinator and the Bicycle and Pedestrian Coordinator											x				x						MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
303	Enact a Complete Streets policy at the county and municipal levels											x				x						MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
305	Incorporate Complete Streets into the Surface Transportation Program – Urban (STP-U) project prioritization criteria											x				x						MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
227	Improve safety along Safe Routes To School routes											x				x						MTP: Grand Forks/East Grand Forks 2035 Long Range Transportation Plan
254	Provide and maintain appropriate roadway crossing safety (for bikes and peds).											x				x						MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
255	Implement additional safety measures where higher bike or ped crossings exist											x				x						MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area

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256	Provide appropriate bicycle and pedestrian facilities adjacent and parallel to roadways											x				x						MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
266	Encourage school districts to build schools at the center of neighborhoods with enrollment areas bounded by high traffic corridors											x				x						MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
267	Building elementary or middle schools adjacent to arterials should be avoided											x				x						MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
268	Discourage school sites that are surrounded by parking lots											x				x						MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
311	ROCOG should facilitate completion of a Rochester Safe Routes to School Study											x				x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
323	Implement strategies to improve safety for walking and biking											x				x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
332	Complete Safe Routes to Schools (SRTS) Plan for Rochester and Small Cities School Districts											x				x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
334	In Rochester urban area, continue to apply adopted Complete Streets policy and principles to al new roadway construction/ reconstruction/repaving projects as a matter of routine practice											x				x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
336	The primary improvement strategy for bicycle and pedestrian traffic in rural and suburban areas should be the development of paved shoulders. Priority should be given to investing in paved shoulders on main corridors connecting cities with other towns and other major destinations such as regional parks. Long term, paved shoulder areas should be considered on all roads wherever traffic volumes are expected to exceed 750 vehicles per day											x				x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
342	Member agencies of the ROCOG Transportation Technical Advisory Committee should coordinate with school district facility planners to support a Safe Routes to School (SR2S) program and to identify improvements needed to enhance pedestrian access to schools in local comprehensive, transportation and school district planning efforts											x				x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan

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345	On urban roadways where path facilities are not specifically identified on the ROCOG Bikeway Plan, sidewalks should be provided on both sides, unless there are physical limitations and land use characteristics that render a sidewalk unsuitable on one side. In these situations, safe and convenient crossing opportunities must be provided to allow pedestrians to proceed to the side with sidewalks.											x				x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
347	Paved shoulder areas should be considered whenever traffic volumes on a local township or county roads are expected to exceed 750 vehicles per day.											x				x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
287	Develop Safe Routes to School (SRTS) and bicycle/pedestrian walkability Plans to aid in safety of non-motorized users.											x				x						MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
289	Work with all Independent Schools Districts (ISD) in APO planning area to determine SRTS needs.											x				x						MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
2	Develop and implement supplemental design guidance for bike and pedestrian facilities											x				x						The MnDOT Bicycle Modal Plan
299	Complete a pedestrian safety action plan											x										MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
241	Identify priority sidewalk links either missing or in disrepair											x										MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
242	Advocate for sidewalk improvements to be included in roadway projects											x										MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
243	Promote design features that make it easier for pedestrians to cross the street											x										MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
244	Educate jurisdictions that ADA design features must be included in street improvement projects											x										MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
245	Plans and use sidewalk inventories to identify the presence or absence of ADA compliance											x										MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
346	In sparsely populated rural areas, gravel shoulders usually are adequate to accommodate the low level of pedestrian activity characteristic of these areas. In higher use areas, a wider roadway including striping of the roadway to delineate a protected area for pedestrians should be considered.											x										MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan

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348	Highway crossings are one of the most challenging aspects of pedestrian travel and the location where nearly all pedestrian-motorist collisions occur. Particularly in areas of high pedestrian activity methods to improve crossing safety should be considered.											x										MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
349	Communities should experiment with innovative ways to increase pedestrian safety. New strategies should be tried on a small scale and may work only under specific circumstances.											x										MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
350	Location of incident and description of situation including number of victims and their condition, other bystanders or responders on scene, and potential hazards on roadway or at scene including violent or armed persons												x	x	x							Minnesota Trauma System Performance Improvement Plan
329	Continued maintenance of geographic information system (GIS) electronic basement for use by dispatchers and emergency management personnel												x	x	x							MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
240	Conduct a multi-modal assessment of emergency-response readiness for metropolitan transportation systems												x		x							MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
247	Work with local emergency responders to ensure coordinated incident management plans												x		x							MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
576	Transit Vehicle Communications to Emergency Response Centers												x				x					ITS Planning and Regional Architecture 2014; Volume 9
566	Incorporate Road Construction Data in CAD Systems												x						x			ITS Planning and Regional Architecture 2014; Volume 9
497	MSP CAD and CARS Integration												x									ITS Planning and Regional Architecture 2014; Volume 9
504	Allow Law Enforcement to Retrieve Data from Onboard Vehicle Computers												x									ITS Planning and Regional Architecture 2014; Volume 9
506	Expand Quick Clearance Policies for Incidents												x									ITS Planning and Regional Architecture 2014; Volume 9
509	Emergency Responder Database												x									ITS Planning and Regional Architecture 2014; Volume 9
510	Enhance Routing of Emergency Vehicles												x									ITS Planning and Regional Architecture 2014; Volume 9
511	Critical Infrastructure Surveillance												x									ITS Planning and Regional Architecture 2014; Volume 9

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531	Automated Data Interface between Local Public Safety CAD Systems and CARS												x									ITS Planning and Regional Architecture 2014; Volume 9
539	Emergency Management Alternate Route Database Development												x									ITS Planning and Regional Architecture 2014; Volume 9
540	Emergency Vehicle Strategic Deployment												x									ITS Planning and Regional Architecture 2014; Volume 9
559	Enhanced Automated and Manual In-Vehicle Notification Assistance												x									ITS Planning and Regional Architecture 2014; Volume 9
560	AVL Systems for Local Responders												x									ITS Planning and Regional Architecture 2014; Volume 9
561	Expand Deployment of Mobile Data Computers												x									ITS Planning and Regional Architecture 2014; Volume 9
562	Remote Posting of AMBER Alerts on DMS												x									ITS Planning and Regional Architecture 2014; Volume 9
563	Wireless Digital Feeds Between MSP and Local EM Responders												x									ITS Planning and Regional Architecture 2014; Volume 9
564	Automated Field Reporting Systems for MSP and Local Law Enforcement												x									ITS Planning and Regional Architecture 2014; Volume 9
302	LAPC should work with FHWA, state DOTs and local jurisdictions to develop a regional traffic incident management (TIM) program												x									MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
262	Develop contingency plans for critical network links with pre-identified emergency detour routes												x									MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
263	Support Metro COG's participation in groups such as Emergency Services Management and other opportunities for regional coordination and collaboration on issues of transportation security and incident response												x									MTP: Long-Range Transportation Plan for the Fargo Moorhead Metropolitan Area
326	Assist in development of key evacuation routes from important activity areas, and include an assessment of improvement needs in future Long-Range Plan updates												x									MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
327	Assist in preparation of alternate route/detour planning to facilitate response to closing major transportation arteries												x									MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan

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328	Assist in preparation of demographic profile information and a geographic inventory of transportation-disadvantaged populations that may need assistance during a disaster to facilitate evacuation and determine if current deployable assets will be available and adequate												x									MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
330	Continue assistance in preparing workshop materials for training exercises and continue to participate in emergency management workshops												x									MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
331	Continued assistance to agencies such as the Rochester Fire Department and Gold Cross Ambulance in facility siting and other studies of emergency management needs as needed												x									MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
226	Work with emergency medical and trauma services to reduce response time and increase survivability												x									Statewide Multimodal Transportation Plan
384	Pursue system-wide, cost-effective safety investments on the state highway system that address fatal and severe injury crashes. Investments will be data driven and incorporated into all applicable projects													x	x							20-Year State Highway Investment Plan (MnSHIP)
387	Continue to evaluate crash data to implement the highest-priority lower cost, proactive treatments													x	x							20-Year State Highway Investment Plan (MnSHIP)
472	Improve data quality of MNSTAR system which is used to submit data to the National EMS Information System (NEMSIS)													x	x							Highway Safety Plan (Federal Fiscal Year 2014)
473	Enhance the Real-Time Officer Activity Reporting (ROAR) system which requires the entry of agency rosters and officer training dates before the overtime hours are worked, and overtime enforcement activity as it occurs													x	x							Highway Safety Plan (Federal Fiscal Year 2014)
474	Conduct technical evaluation of currently available cras records systems and produce a cost estimate for the Minnesota crash system upgrade													x	x							Highway Safety Plan (Federal Fiscal Year 2014)
475	Link MNSTAR data to CODES; develop a public use data set and a menu-driven user interface for CODES; and analyze the CODES data to meet requests of the CODES Board													x	x							Highway Safety Plan (Federal Fiscal Year 2014)

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476	Assist local agencies with implementation of e-Charging applcation that allows law enforcement to electronically send citations to the courts using the same schema as other criminal justice integration efforts													x	x							Highway Safety Plan (Federal Fiscal Year 2014)
477	Fund a replacement for the crash analysis application which has been in production for 30+ years on a functionally obsolete mainframe													x	x							Highway Safety Plan (Federal Fiscal Year 2014)
478	Look at the interaction between data suppliers and the technology used to capture data as a compliment to the Crash Records re-design project													x	x							Highway Safety Plan (Federal Fiscal Year 2014)
484	Effectively use available and emerging traffic data, crash data, and Computer Aided Dispatch (CAD) data to strategically allocate our resources for maximum effectiveness													x	x							Minnesota State Patrol 2013-16 Strategic Plan
486	Minimize data entry and paperwork duplication while streamlining reporting processes to maximize the amount of unobligated time available for enforcement activities													x	x							Minnesota State Patrol 2013-16 Strategic Plan
490	Improve automated reporting systems to reduce time necessary to report, manage, and retrieve documents; i.e. Power DMS, e-citations, crash reports, arrest reports, SPAIS activity system													x	x							Minnesota State Patrol 2013-16 Strategic Plan
491	Continue the collection, dissemination, and use of data such as CAD, RMS, and MNDOT data to improve operational decisions													x	x							Minnesota State Patrol 2013-16 Strategic Plan
492	Incorporate data-driven and GIS practices in agency decision making													x	x							Minnesota State Patrol 2013-16 Strategic Plan
494	Research options for a new MSP crash reporting system with report to command staff by July 1, 2013													x	x							Minnesota State Patrol 2013-16 Strategic Plan
308	Local roadway, law enforcement, emergency response and public health agencies should continue to coordinate review of fatal and serious injury crashes through the Safe Communities Fatality Review Board													x	x							MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
312	ROCOG should work with its partners to insure the timeliness and quality of crash data which is critical to support highway safety efforts													x	x							MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
317	Continue to monitor crash data on a regular basis													x	x							MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
519	Enhanced Data Entry and Integration of Work Zone Information													x					x			ITS Planning and Regional Architecture 2014; Volume 9

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549	Expand Total Stations and Photogrammetry Deployment													x								ITS Planning and Regional Architecture 2014; Volume 9
558	Enhanced Crash Database													x								ITS Planning and Regional Architecture 2014; Volume 9
565	DVR to Review Central Images during an Incident													x								ITS Planning and Regional Architecture 2014; Volume 9
578	Develop and Provide a Uniform, Real-Time Automated Crash Notification System													x								ITS Planning and Regional Architecture 2014; Volume 9
580	Data: Improve understanding of crashes involving Commercial Vehicles through the use of a new tool – the Minnesota Crash Mapping Analysis Tool (MNCMAT). The document commits to providing each region with training in the use of the tool and the expected outcome is to better identify locations where crashes involving Commercial Vehicles occurred, thus allowing a more effective allocation of resources.													x								Minnesota's FY2013 Motor Carrier Safety Assistance Program/Commercial Vehicle Safety Plan
284	Work with Mn/DOT, area jurisdictions and local EMS to determine safety issues and deficiencies on transportation system.													x								MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
285	Work with local jurisdictions to develop metro area safety audit and pavement rating system.													x								MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
383	Update district safety plans to identify priority locations for lower cost, high-benefit improvements														x							20-Year State Highway Investment Plan (MnSHIP)
385	Address sustained crash locations with appropriate fixes that cost-effectively reduce the identified types of crashes at that location														x							20-Year State Highway Investment Plan (MnSHIP)
318	Identify locations where detailed investigations of safety problems through use of the Road Safety Audit procedure should be conducted														x							MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
324	ROCOG and its partner agencies should consider establishing a process to identify high priority projects that would be eligible for funding under the various targeted safety funding programs in order to have a set of projects "on the shelf" that have demonstrated community support in advance of responding to solicitation notices														x							MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
282	Provide required investment through HSIP with additional funding through local annual federal application process for safety improvements.														x							MTP: St. Cloud Metropolitan Area 2035 Transportation Plan

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283	Identify and invest in proper maintenance of local federal eligible roadways (i.e. major collector, minor/major arterials, principal arterials).														x							MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
426	Increase bicycle helmet usage, enhanced enforcement of bicycle laws and publicize issues															x						County Road Safety Plans-Otter Tail County (Example)
293	LAPC staff serving as the disseminator of bicyclist infrastructure concerns (as posted to the Coulee Bikes Web site)to the appropriate agency															x						MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
306	Implement engineering recommendations in the regional bicycle plan															x						MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
343	To insure the safe and functional design of bikeways, the most current versions of the bikeway design manuals noted below should serve as the official policy guide for planning design, construction and maintenance of bikeways in the ROCOG Planning Area: MNDOT Bicycle Modal Plan, Minnesota Department of Transportation Bikeway Facility Design Manual; Guide for the Development of Bicycle Facilities, AASHTO.															x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
344	In rural areas, separate bikeway accommodations including paved shoulders generally are not warranted on local roads because the low volume of usage allows motor vehicle drivers to safely pass bicyclists with a low likelihood of encountering on-coming traffic. Adding minimal-width shoulders or wider travel lanes can improve conditions for bicyclists on roads with moderate traffic volumes where there are no visibility concerns. Extra pavement width should be a consideration on roads with volumes at or projected above 750 vehicles per day.															x						MTP: Rochester Olmsted Council of Governments 2040 Long Range Transportation Plan
307	Identify the infrastructure needs of freight operators in the region																x	x				MTP: 2035 La Crosse and La Crescent Metropolitan Area Transportation Plan
288	Work with local freight providers and stakeholders to determine safety issues and needs throughout the APO planning area.																x	x				MTP: St. Cloud Metropolitan Area 2035 Transportation Plan
555	Work Zone Restriction Information Automation																x		x			ITS Planning and Regional Architecture 2014; Volume 9
538	Maintenance and CVO Alternate Route Database Development																x					ITS Planning and Regional Architecture 2014; Volume 9

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554	CVO Database Enhancement																x					ITS Planning and Regional Architecture 2014; Volume 9
556	Commercial Vehicles as Probes																x					ITS Planning and Regional Architecture 2014; Volume 9
557	RFID Tags for Identification of HAZMAT Materials																x					ITS Planning and Regional Architecture 2014; Volume 9
581	Driver/Vehicle Inspections: Provide training for inspectors in order to conduct inspections at both fixed and roadside locations plus dock audits.																x					Minnesota's FY2013 Motor Carrier Safety Assistance Program/Commercial Vehicle Safety Plan
582	Enforcement: Conduct focused saturation campaigns and to use traffic stops of Commercial Vehicle drivers as a tool to ensure safe operations and decrease the number of Commercial Vehicle involved crashes.																x					Minnesota's FY2013 Motor Carrier Safety Assistance Program/Commercial Vehicle Safety Plan
583	Compliance Reviews: Conduct Comprehensive Safety Analysis (CSA) Interviews, perform Interventions/Reviews on freight motor carriers and Hazmat Reviews on Hazmat shippers and carriers.																x					Minnesota's FY2013 Motor Carrier Safety Assistance Program/Commercial Vehicle Safety Plan
584	Public Education and Awareness: Conduct Motor Carrier Safety and Hazmat classes and Public Outreach Events.																x					Minnesota's FY2013 Motor Carrier Safety Assistance Program/Commercial Vehicle Safety Plan
223	Work with local and regional partners that are public transit providers to ensure enforcement of safety and security requirements																x					Statewide Multimodal Transportation Plan
541	Active Flashing Signals and Gates at Highway/Railroad Intersections																	x				ITS Planning and Regional Architecture 2014; Volume 9
238	Inventory rail crossings and characteristics																	x				MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
239	Study traffic volumes, daily train trips, and crash exposure ratings; recommend improvements																	x				MTP: Directions 2035 - The Duluth-Superior Long Range Transportation Plan
516	Expand Automated Flagging System for Work Zones																		x			ITS Planning and Regional Architecture 2014; Volume 9
521	Work Zone Intrusion Alarm System																		x			ITS Planning and Regional Architecture 2014; Volume 9
525	Provide Information on Alternate Routes and Detours Due to Roadwork																		x			ITS Planning and Regional Architecture 2014; Volume 9
571	Develop Vehicle to Vehicle and Vehicle to Infrastructure Communication																				x	ITS Planning and Regional Architecture 2014; Volume 9

Appendix B: Strategies from stakeholders

Ref #	Strategy	Culture and Awareness	Intersections	Lane Departure	Unbelted	Impaired Drivers	Inattentive Drivers	Speed	Older Drivers	Younger Drivers	Motorcycles	Pedestrians	EMS and Trauma Systems	Data Management	Management Systems	Bicyclists	Commercial Vehicles	Trains	Work Zones	Unlicensed Drivers	Vehicle Safety Enhancements
66	Advertise more and across multiple channels about new roadway characteristics and signage (e.g. diamond interchanges, CMS)	x	x	x																	
11	Red light cameras with an education campaign	x	x																		
31	Washington State model for high visibility enforcement (less crackdowns, sustained team, zero tolerance enforcement, prosecution, media, etc.) for seat belt, speed and impaired	x			x	x		x													
139	Tailor messages to reach the final groups that won't wear their seat belt and continue to drink and drive	x			x	x															
42	Education and demonstration for prevention (e.g. helmets on bikes, seatbelts, operation prom nights)	x			x					x	x					x					
80	Change culture to make seat belt use automatic	x			x																
160	Assess health service tax for people injured that are not wearing seatbelts	x			x																
68	Life-long drivers education for adults and seniors upon license renewal on topics such as motorcycles, distraction and alcohol	x				x	x		x		x										
84	Deliver hard media message similar to smoking campaign, showing side effects (e.g. Australian speed message)	x				x		x													
192	Health issues and driving: Instead of focusing on "elderly" can the focus be on health issues that can affect the driving capabilities of the driver. Some "older" drivers have no health issues and they drive just fine, but health issues – migraine headaches / muscle pain / blurry eyesight / limited night vision / and related medication use – that may have more effect for behavior – rather than saying you're age _X_ and are a problem. For the youth – it is really the inexperienced driver (whose brain and skills are still developing). It is at both ends of the spectrum. Get the health community to help work with this – instead of saying "you need a driver" they need to say "you need a driver because the drugs you are taking can affect your reflexes and we would not want you to be injured."	x				x			x												
100	Change terminology from drunk driving to drink driving	x				x															
101	Zero tolerance for DUI	x				x															
152	Create a charter to revamp DWI task force to address and develop potential impaired driving legislation	x				x															
162	Increase tax on alcohol to pay for service such as DWI court and probation monitoring treatment	x				x															
196	Prize for reporting drunk drivers: If anyone is aware that somebody drank too much to drive and is heading out to drive, they should be given an incentive ($100 -$1,000) for reporting the person to law enforcement agencies so that they can be stopped before they cause a crash. The award is payable to anyone providing information leading to a successful arrest. Providing false information more than once should have a small penalty to deter excessive false reporting.	x				x															
199	"Ignition interlock on all state vehicles: If we expect the public to adopt a positive traffic safety culture we must lead by example. All state vehicles should be equipped with ignition interlock systems. A similar program was initiated in Sweden http://www.thecommunityguide.org/mvoi/PIIS0749379710007130.pdf."	x				x															
132	Targeted public service announcements with radio and other media (e.g. teen drivers, elderly drivers, distracted drivers)	x					x		x	x											
70	Shift culture on acceptability of texting/distracted driving	x					x														

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79	Address perception that 10MPH over the speed limit is acceptable	x						x													
81	Higher penalties for speed violations (e.g. "speed" court)	x						x													
77	Develop more opportunities for "safe-ride" programs for high-risk populations (e.g. motorcyclists, minors, rural drivers, elderly)	x							x	x	x										
90	Age appropriate incentives for positive, consistent and improved behavior	x							x	x											
169	Regular assessments of drivers after age 80	x							x												
72	Require education for parents of new drivers	x								x											
95	Make driving safety fun for younger drivers (ages 16-22); have big, popular parties - with music, games, driving simulators, competitions, etc. with prizes; create positive associations with driving safety	x								x											
97	Introduce safety as a value to young Minnesotans	x								x											
110	Health care initiative for traffic safety	x								x											
128	Work directly with schools to create opportunities for effectively educating students (e.g. like "fire protection week" in grade school)	x								x											
130	Enable/encourage parents of high school students to form TZD coalitions (e.g. TZD prep for prom, homecoming and other topics)	x								x											
133	Educate lawmakers on the benefit of graduated drivers licensing laws	x								x											
136	Improve the requirements and quality of drivers education programs and audit them; too many drivers ed companies are average or below average	x								x											
164	Strengthen graduated drivers license requirements (e.g. lengthen existing time period for how many passengers)	x								x											
165	Increase drivers license age to 17	x								x											
175	"Early safe driving education: Developmentally appropriate traffic safety education campaign designed for pre K through 9th grade. Program would include topics such as how to stay safe as a passenger throughout each stage (e.g. booster seats, seatbelts, learning how to drive). How to advocate for yourself (e.g. ask others to wear seatbelts, say something when a driver is impaired or otherwise unable to drive). How to reduce distractions in the car (e.g. offer to adjust the radio or screen calls for the driver). How to appropriately use roadway features to stay safe. This program should teach through positive traffic safety norms (most people wear seat belts and drive sober) and reinforce existing positive habits. This program would be available through school and community organizations (e.g. park and rec programs, Scouts and 4-H) with an added parent participation component in order to further entrench positive traffic safety behaviors in children."	x								x											
104	Change advertising to show safety positively (e.g. not speeding, new cars, motorcycles)	x									x										x
357	Engage large motor vehicle users in bike/ped awareness (e.g. City of Minneapolis approach)	x										x				x	x				
91	Encourage walking and bicycling; drivers see the streets differently when they have the experience of being a more vulnerable user	x										x				x					
143	More focus and educuation on active transportation options (e.g. biking, walking)	x										x				x					
203	"Broader scale ped and bike education and enforcement campaigns: There are a few ped and bike safety education campaigns out there. The state of Minnesota has one, some cities have their own, but a broad scale education campaign combined with consistent increased enforcement has been shown to increase motorist yielding rates to pedestrian and bicyle traffic. This website explains where others have been successful: http://www.walkinginfo.org/faqs/answer.cfm?id=4119"	x										x				x					

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353	Reinforce need for education and awareness of bike/ped road use	x										x				x					
358	Educate bicyclists about roadway safety rules and issues (e.g. Portland, Georgia and Arizona bike user guides)	x										x				x					
359	Change cultural view of bike/ped rights (privileges) to use public roads	x										x				x					
369	Educate ALL ROAD USERS about what roads are for, how to use them safely, etc. (e.g. Bike! Walk! Fun! curriculum)	x										x				x					
379	Ensure state leaders understand bike/ped laws	x										x				x					
382	Change culture/awareness as it relates to non-motorized travel on roads	x										x				x					
107	1. Across cultures - regional - diversity - insurance companies - new Minnesotans - North Minnesota v. South Minnesota 2. Creating positive culture - safety as a value - younger audiences - making major decisions - culture of collaboration - bringing in new audiences. 3. Messaging supports the culture	x											x								
111	Work on culture regionally; Northwest is different than Southeast or Metro regions	x											x								
159	Separate EMS funding from ticketing process because when tickets go down from good behavior then EMS funding goes down	x											x								
121	Educate the media on importance of broadcasting crash data and contributing factors of fatalities and serious injuries, especially in rural areas	x												x							
126	Teach about TZD at "trooper school" and other law enforcement programs and emphasize importance of filling out crash reports	x												x							
140	Make SHSP a public engagement plan that includes Department of Eduation, internal and external engagement, current partners with education/outreach skills (e.g. schools, publich health and drivers education)	x													x						
205	Common goals: Develop common goals that everyone can rally around for traffic safety.	x													x						
367	Work with minority community leaders to educate new Minnesota residents (ideally within first year of being in US) about biking options, safety, etc.	x														x					
375	Statewide, coordinated cultural campaign for biking (e.g. DPS success with impaired and unbelted; AAA bike safety video)	x														x					
25	Conduct research to examine the impact of emerging technologies on driver behavior	x																			x
12	Feedback and education through crash data visualization	x																			
26	Insurance increases or decreases based on risk factors/behavior (e.g. ignition interlock decreases insurance rate and rewards good behavior)	x																			
32	Increase media use for specific enforcement areas and initiatives	x																			
33	Higher penalty for non-alcohol crashes that cause death and injury	x																			
34	Make traffic issues a higher profile in the courts	x																			
36	Revisit payable list (going online to pay fines, not in front of judges)	x																			
73	Coordinated media effort with lifetime driver education and technology interaction	x																			
76	More community classes/education on roundabouts, diverging diamond interchanges and zipper merge	x																			
78	Personalize crash statistics by drawing parallels to examples like full baseball stadium, size of an entire town, etc.	x																			
82	Study how behaviors shift over time (e.g. compliance in beginning vs. long run)	x																			

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83	Use edgy advertising or media buys	x																			
85	Get public health to be a message leader nationally; traffic safety impacts are a public health issue and should be periodically reported similar to what is done with the flu	x																			
86	Coordinate media buys	x																			
87	Branding of TZD	x																			
88	Increase awareness of crash dynamics (e.g. severity of crash forces)	x																			
89	Get people to take responsibility for crashes	x																			
92	Improve and expand TZD partner collaboration (e.g. judges, insurance companies, trucking)	x																			
93	Develop a plan and implement that plan (similar to Australia) to change culture of speeding	x																			
96	Encourage more insurance companies to reward (e.g. saving money) good driving	x																			
98	Introduce culture change to create an understanding and common goal of zero deaths	x																			
99	Repeal laws that do not support positive traffic safety culture (e.g. Dimler amendment)	x																			
102	Safety culture: prevention as desirable value, communicate risk, community and cultured expectations	x																			
103	Change terminology from accident to crash	x																			
106	Traffic safety required courses for public health in college	x																			
108	Enforcement effectiveness must be through personal contact and shifting culture to how 4E partners impact fatal and serious injury crashes	x																			
109	Put TZD advertising/public service announcements into kid-friendly areas, restaurants, day-care, etc. to introduce TZD at an earlier age	x																			
112	Communicate safety across cultures especially to new Minnesotans (ethnic diversity)	x																			
113	Involve people who have a passion for drivers safety, such as parents of young drivers	x																			
114	Insurance approach to traffic safety (e.g. interlocks as benefit vs. indication to drop customer)	x																			
115	Make culture of collaboration "just the way it is" among 4Es in TZD	x																			
116	Develop more refined "agent" groups by cultures then work on messaging to each group (e.g. people that refuse to use seatbelts would be a group)	x																			
117	Identify how tools impact different audiences	x																			
118	Increase public service announcements/advertising among social media (e.g. Twitter, Facebook)	x																			
119	Enforce traffic safety laws to support a cultural view that traffic safety is a value	x																			
120	Find a national or state sports celebrity to endorse traffic safety messages and be a spokesperson	x																			
123	Develop five-year TZD/SHSP internal and external enagement plan (e.g. Oregon Transportation Safety Action Plan)	x																			
124	Talk about "fatal free" days on overhead freeway message boards	x																			
125	Engage the Department of Education in TZD to ultilize their expertise to bring TZD to public education	x																			
127	Work with media partners to develop more dramatic messages that convey the problem of traffic related servere injuries and deaths	x																			

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129	Education house cleaning and one-stop shop for TZD information, public service announcements, handouts, statistics, etc.	x																			
131	Work with driver's education programs	x																			
134	Reach out to local agencies with nationwide education/promotion materials to have locals put links on website, city newsletter, local cable, etc.	x																			
135	Ultilize current partners with education and outreach skills like schools, publich health, drivers education, etc.	x																			
137	Now that so many traffic violations are payables, make part of the penalty education	x																			
138	Require or provide incentives for defensive driving classes for all drivers (e.g. partner with insurance companies)	x																			
141	Develop target audience media strategies to reach those who have plateaued on compliance	x																			
142	See and promote public transit as a safety strategy as it is one of the safest modes of transportation	x																			
146	Form a TZD policy subcommittee to intergrate governmental policy (MnDOT, DPS, MDH) with advocacy group efforts (Minnesota Safety Council, MADD, etc.)	x																			
147	Proactively engage legislative commitees to educate them about TZD, problems, obstructions and effectiveness of strategies	x																			
148	Get TZD partners, coalitions and community groups to approach their legislators as constituents concerned about traffic safety	x																			
149	Use localized audiences and centralize lobbying efforts at Capitol	x																			
150	Create a "safety caucus" at legilsature and fund Minnesota Safety Council to develop (like primary belt effort)	x																			
151	Covene a task force to sit with legislators to map out a multi-year traffic safety policy strategy	x																			
153	National body of traffic laws for consistency across the country (e.g. seat belts, child protenction systems, speed limit, etc.)	x																			
154	Directly involve Minnesota city/county associations in education and policy	x																			
155	Systematic way to educate police about new laws and changes (e.g. seatbelts, roudabouts)	x																			
156	Cite businesses for employees' repeat offenses	x																			
157	Encourage Govenor and legislature shows of support	x																			
158	Have staff walk the talk internally. Drive the speed limit, don't run red lights, promote use of the bus.	x																			
161	Work with industry and policy makers to make alternatives to driving available	x																			
163	Make causes of fatal crashes public to reduce rumors and misunderstandings	x																			
166	Specific policies to advance safety: interlocks on first offense, handheld cell phone ban, helmet law, stronger GDL	x																			
167	Encourage agency support for photo enforcement of red light running	x																			
168	Pass ban on handheld cell phone as other states have seen 40% reduction in overall cell phone use	x																			
170	Require all drivers to go through same licensing process	x																			
171	Funding for Driver and Vehicle Services to improve driver training	x																			
172	Perform true road testing	x																			

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188	Public policy regarding traffic safety: Repeal existing laws such as Dimler amendment, seat belt gag rule, secondary enforcement laws that inhibit enforcement and send a message to the public that undermines traffic safety.	x																			
189	Rideshare: Bring back a form of Rideshare. State would partner with insurance companies and other organizations like Twins, Vikings, casinos, MADD, etc. Drivers and riders could receive reduced rates including gas tax break. Giveaway tickets and play and stay packages etc.	x																			
190	Media cooperation: Gather a statewide media TZD Coalition to highlight the program, including upcoming enforcement events.	x																			
191	Fact sheet for local elected officials on techniques to slow traffic: A fact sheet / brochure that would identify technique for local elected officials to change driver behavir and increase awareness of community residents. A lot of times we hear about communities or residents in communities wanting slower vehicle speeds, so it is safer for children / peds / bikes, etc. A lot of times there are requests for the speed studies. Instead of rumbles on the road to slow traffic down for entering town (a solution communities think would work), having additional Law enforcement, or the sign that identifies the driver speed, there are other techniques; but this might help at the small community level – for elected officials.	x																			
193	Eliminate the "no fault" law related to traffic crashes: Motor vehicle crashes are the result of something going wrong with the driver or vehicle. The no fault law implies that nobody is responsible for motor vehicle crashes in some instances. Consumers also have to pay additional insurance costs for this "coverage". This would require the officers to assign fault when investigating crashes but it would also facilitate a better understanding of crash data by having the at fault party identified so better analysis can be conducted to mitigate problems.	x																			
197	"Phone numbers on drivers licesnse/making driving complaints pull over: By having everyone's phone numbers on their drivers license with Driver and Vehicle Services, it would make it easier to try to contact drivers of driving complaints. Many times a driving complaint comes in and the hunt is on to find them. In the time it takes to find them many of these drivers crash resulting in fatalities to them self or other drivers on the road. If we could contact these drivers when the complaint comes in and make it a law that they must pull over and wait for an officer to clear them to drive it would save lot of crashes. Having phone numbers attached to drivers licenses would make it faster for dispatch or officers to contact the driver."	x																			
198	More HSIP funding for education activities: Many times crashes are caused by driver behavior, however you cannot engineer your way out of driver error completely. We've spent a lot of previous HSIP funding on infrastructure project (and we can continue to do so), but it would be nice to see more HSIP funding go toward education/non-infrastructure activities. Perhaps the funds could be used to support work that local TZD coalitions are doing.	x																			
208	Engage legislators on specific issues: Engage legislators on specific issues; help them understand how challenging it can be to enforce some laws like texting while driving.	x																			
210	Partner with gas stations: Gas stations have a ton of interaction with drivers. Consider partnerships and rewards for good driving habits (e.g. free gas for not texting as you enter the station or if your seatbelt is on).	x																			
213	Broader regional approaches: Incorporate a broader regional approach that works across state boundaries especially in areas like Fargo/Moorhead.	x																			

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215	Positive reinforcement approaches: Resell TZD and figure out what that next big thing might be. Pushing for policy change has been mentioned many times, but how could we look at value-added, more positive approaches (e.g. ignition interlocks, insurance benefits). Positive, value-added approaches also give legislators an opportunity to look good/do good.	x																			
216	Crashes can be educational opportunities: There are still a lot of little things that can make an impact. Continue to leverage crashes as an opportunity to talk to a passionate community about driver behavior and other issues. Encourage more/continued collaboration among the Es.	x																			
217	Enhance safety partnerships: TZD initially pushed collaboration among the 4Es but we seem to be falling back into our 4E groups. How can we bring in new partners to pull us back together and learn together to talk to other audiences?	x																			
594	Research and develop driver education for veterans returning to civilian driving after active duty.	x																			
174	Dynamic warnings/signs on roadside: Use to detect vehicles that are speeding or displaying other unsafe behavior and provide a warning message to alert driver of unsafe driving behavior.		x	x			x	x													
54	Partner infrastructure and vehicle technology to identify infrastructure needs and how the two will interact		x	x																	x
56	More technology in the vehicle for road signs, speed limits and in-vehicle rumbles		x	x																	x
6	Build technology into transportation infrastructure		x	x																	
7	Speed and red light enforcement for behavior modification		x					x													
8	Automated speed and red light enforcement		x					x													
176	"Curb bump outs at crosswalks and trail crossings: Curb bump outs reduce crossing distance, provide greater visibility of the bike or pedestrian crossing, and may serve to cue drivers to slow down. This website has a brief description http://legistar.cityofmadison.com/attachments/1a347ec1-7e7f-453c-9ccc-e1216e277d05.pdf. Often it is difficult to see a pedestrian or bicyclist at trail crossings, especially if there are trees or shrubs right up to the edge of the road. They are also helpful in business/downtown areas where on street parking is permitted. The pedestrian is more visible to oncoming traffic."	x									x			x							
185	"Bicycle/pedestrian signal detection: Approximately half of bicycle or pedestrian crashes are caused by non-motorist error. Traffic signals using detectors do not tend to sense bicycles on the road which can lead to disrespect for all signals. Look into cost-effective modifications or designs for updating loop-detectors for bicycles. Encourage use on all designated bike routes and major throughfares."	x									x				x						
201	"Raised crosswalks at free rights: Raised crosswalks have a traffic calming effect. Large, sweeping free rights as you see in complex intersection designs/interchanges (i.e., DDI's, SPUIS) allow for higher speed traffic and unexpected entries of pedestrians and cyclists at the crosswalk because of the nature of the design. Raised crosswalks can slow traffic, make the crossing location obvious to vehicles, and make pedestrians more visible. Here is a good description: http://www.portlandoregon.gov/transportation/article/83924"	x									x				x						
371	Reduce turning radius at corners to slow vehicles		x									x				x					

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380	Explore best practice summit on ice/snow removal on sidewalks and at intersections		x									x				x					
362	Consider rectangular rapid-flashing beacons (RRFB) and high intensity activated crosswalk (HAWK) pedestrian-activated signals to improve pedestrian visibility/motorist yielding		x									x									
1	Implement state-of-the-art traffic control and safety systems to ensure a safe and efficient rail system on key arterials		x															x			
5	Develop more tools for urban intersection safety (there are currently limited low-cost proactive approaches)		x																		
58	Educate on standardized signing at interchanges and intersections for those who aren't familiar with things like diamond interchange, roundabout and left exits		x																		
63	Expand use of intersection types that reduce and relocate conflict points to reduce severe right angle crashes (e.g. roundabouts, reduced conflict intersections)		x																		
219	Automated enforcement of red light running.		x																		
186	Dedicated commercial vehicle lanes: Major highways and interstates could have a dedicated commercial vehicle lane to reduce congestion and freight related crashes.			x													x				
57	Market rumble strips for lane departure crashes			x																	
59	Expand cable median barriers			x																	
60	Test and evaluate some 2+1 corridors (2 lane highways with cable barrier separation) like those used in Sweden			x																	
61	More lane departure countermeasures especially for curves (e.g. chevrons, pavement friction, wider shoulders)			x																	
62	Safety edge on all paving projects, especially on local system			x																	
67	Find an alternative to centerline rumble stripes that is effective but does not create noise issues for residents living along the roadway			x																	
41	Notation of belt use/alcohol shared with other safety partners such as fatal review committees				x	x															
202	Seatbelt rewards: 100% seatbelt usage with more creative approaches to get there from 93% (e.g. not paying for the first $1,000 of your crash cost if you were wearing seatbelt); research what other countries have done.				x																
21	In-vehicle detection for distracted driving, fatigued driving and impaired driving					x	x														x
207	Partner with medical community on drugged driving: Drugged driving should involve medical community – prescription and synthetic drugs play a role and we need medical community involved to better understand the issue and identify potential solutions.					x							x								
15	Passive interlocks built into the car					x															x
20	Ignition interlock standard on all vehicles					x															x
23	Encourage vehicles to be manufactured with an option of ignition interlock					x															x
27	Screening to determine risk, motivational therapy and brief interventions within 48 hours of DWI arrest					x															
30	Funding and implementation of DWI/drug courts in all judicial districts					x															
35	Increased DWI checkpoints					x															
37	24/7 availability for courts and twice per day breath tests for repeat DWI offenders					x															
39	Increase drug recognition training for officers					x															
75	Analyze use of interlock information to address behavior change					x															

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94	Introduce (change laws to allow) random breath testing					x															
214	Install ignition interlock on first offense.					x															
71	Zero tolerance for teen/new driver texting, DUI and speeding with mandatory probation classes and quick consequences						x	x		x											
16	After-market in-vehicle technologies for distraction						x														x
74	Technology to limit cell phone/texting capabilities while driving						x														x
28	Increase frequency and intensity of distracted driving enforcement effort						x														
29	Higher penalties/consequences for inattentive driving infractions						x														
187	Statewide hands free law for cell phones						x														
206	Remove driving distractions: Distracted driving and the things that cause it should be removed from driving (e.g. policy that requires vehicles to disable cell phones over a certain MPH).						x														
173	Automated speed enforcement: Enforcement with automatic ticketing, especially in work zones.							x											x		
10	Technology to shut down criminal vehicles during high speed chases or for speeding vehicles							x													x
9	Conduct research to examine the impact of automated warnings vs. automated ticketing for speeding and other traffic violations							x													
24	Adapt smartphone based driver feedback systems for other high risk populations (e.g. motorcyclists and seasoned drivers)								x		x										x
180	"Senior driver safety (55+) training/refresher: Motivate senior drivers to take Driver Safety Refresher courses by: 1) Increasing 10% auto insurance discount to 20% for three years (govt. subsidy or tax credit for extra 10%); 2) Age 75+ mandatory classroom attendance or waiver by authorities; 3) Driver License renewal after age 75 based upon more than simple eye chart, such as apparent congnizant or physical infirmitie; 4) Educate the public with step-by-step process to report potential driver disfunction due to aging (require identification of the person reporting; 5) Reduce Sr. Driver initial classes from 8 to 4 hours; 6) Reduce Sr. Driver Refresher courses from 4 to 2 hours."							x													
181	"Inexpensive portable driver simulators: Equip Minnesota county driver license centers with portable driver simulators designed to determine if individual is aware of potential dangers due to health/aging issues. Require 75+ drivers applying for license renewal to voluntarily take the 8-10 minute test. If test indicates potential problem, arrange for behind-the-wheel assessment by state-licensed instructors."							x													
183	Senior driver safety online classes: Recognize and qualify senior drivers who take the Senior Driver Safety course online for 10% insurance discount.								x												
184	Online driver safety course: Allow Senior Drivers (55+) to qualify for 10% auto insurance discount by completing an online course authorized by the State of Minnesota.								x												
69	Limit teen passenger allowances to age 18									x											
105	Create health programming for teens around traffic safety									x											

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178	Young adult safe driving program: Safe driving program designed specifically for young adult drivers and roadway users 21-30 years old. Rooted in best practices and supported by social science research, this program would be designed to help promote safe decisions in young adults through promotion of positive normative behaviors (e.g. most people drive sober, most people wear their seat belts). This program should not be limited to traditional media outlets, and should include interactive components and other venues proven to resonate with the target age group.									x											
179	Enhance novice driver education programs: Instructor continuing education and parent awareness/involvement isn't currently required. Curriculum requirements are currently very basic. Only one person has oversight of over 350 providers. Programs need to be improved by statute and rule changes, and supported with additional staff.									x											
204	Young drivers for agricultural purposes: Agricultural community should also be addressed when looking at things like young drivers hauling crops from field to market; legacy policies on issues like this should be reviewed for safety.									x											
218	Restrict passengers for teen drivers: For teen drivers under age 18 it's illegal to use a cell phone in any way while driving. Do we know what the three big distractions are that we allow: three passengers! Why do we limit cell phones but not passengers?									x											
177	Motorcycle specific hazard alert warning signs: The state's Motorcycle Safety Advisory Task Force has recommended MnDOT begin using the MUTCD W8-15P motorcycle sign in conjunction with other warning signs when there is a road condition, such as a metal bridge deck, that presents an increased hazard for two wheeled vehicles.										x										
195	Mandatory helmet law for motorcycle riders.										x										
373	Review crash data more closely for bike/ped issues in more rural areas											x		x		x					
361	Evaluate MnDOT cost participation policy to ensure that it doesn't unnecessarily prohibit bike/ped uses											x			x	x					
370	Consider hood mirrors and other tools for large vehicles											x				x	x				
2	Develop and implement supplemental design guidance for bike and pedestrian facilities											x				x					
354	Look to things that enhance safety for ALL road users - not just vehicles, just peds or just bikes (e.g. road surface utilization, speed management)											x				x					
355	Retest drivers to keep them educated on changes to laws, practices, rights, etc. (e.g. bike shoulders, yield laws)											x				x					
356	Make defensive driving courses address bike/ped more consistently											x				x					
360	Support legislative initiative to use photo enforcement at intersections which would reduce crashes overall as well as bike/ped crashes at intersections											x				x					
363	Consider "road diets" (four lanes converted into two through lanes, center turn lane/median refuge island and then bike lane/sidewalk/on-street parking) whenever mill and overlays are done											x				x					
368	Complete Streets implementation for bikes/peds											x				x					
372	Improve connections among sidewalks/bike routes											x				x					
374	Develop officer training on enforcement of bike/ped laws, perhaps through officer licensing process											x				x					
376	Assess state aid rules to ensure local roads are addressing bike/ped safety as they should											x				x					
378	Need to have updated bike and pedestrian plan											x				x					

Ref #	Strategy	Culture and Awareness	Intersections	Lane Departure	Unbelted	Impaired Drivers	Inattentive Drivers	Speed	Older Drivers	Younger Drivers	Motorcycles	Pedestrians	EMS and Trauma Systems	Data Management	Management Systems	Bicyclists	Commercial Vehicles	Trains	Work Zones	Unlicensed Drivers	Vehicle Safety Enhancements
366	Consider leading pedestrian intervals to provide a "head start" for pedestrians before turning traffic is released											x									
377	Explore 3' buffer law for peds (similar to current law for bikes)											x									
381	Use Federal Highway Administration PEDSAFE countermeasures for pedestrian safety and accessibility problems											x									
43	Crash implication training for emergency trauma services												x								
44	Continue training of existing trauma system and resources to use to the greatest extent												x								
45	Evaluate certification requirements for EMS (paramedics and volunteer EMS)												x								
46	Spinal injury recognition and protocol for expediting transport												x								
47	Communication training across EMS services (from narrow banded to 800 technology)												x								
200	Emergency medical scenes information exchange and training: In order to prevent further injury offer opportunities for first responders, EMS, law enforcement, and road construction/mainenance crews to exchange knowledge about strategies to reduce the risk of secondary crashes at the crash scene.												x								
145	Refocus policies based on statistics, not intuition													x	x						
13	Robust data systems for analysis of crashes													x							
14	Closer to real-time crash data													x							
38	Increase use of crash mapping to determine location of traffic enforcement (e.g. DWI mapping) for data driven enforcement													x							
51	Reassess projections for future vehicle miles traveled given than VMT has been flat or declining for several years													x							
144	Support for robust data systems (e.g. crash, roadway, citation)													x							
194	Develop a mechanism to share crash data with the public: There is a public desire to get access to quality crash data in a timely manner. A venue needs to be developed that allows simple crash analysis to be conducted by the public with little hand holding from MnDOT or DPS. The level of detail needs to be fleshed out but giving the public the ability to find out how many people were killed or seriously injured in their city or on a predefined strech of roadway would be a substantial improvement to what is available to them currently (which is nothing).													x							
212	Faster crash information: Get better information more quickly on crashes to make fresh, better decisions – especially as numbers go down and it gets harder to look at causes in an aggregate fashion.													x							
48	Update to MnDOT district and county road safety plans														x						
49	Market/make communities and professionals aware of safety plans														x						
50	Do research planning on how to communicate and get adoption of new engineering strategies in communities; find early adopters and identify how to get everyone to adopt a new innovation to improve safety														x						
52	Consult out completed plan sets for safety projects because of level of effort especially at local level														x						
64	Identify returns on investment, marketing and education tools and best practice reviews for safety strategies														x						
65	Assess policy on free right turn lanes and dedicated right turn which can lengthen pedestrian crossing distance and pose pedestrian risks														x						
122	Increase public awareness of SHSP; staff a small group to gather input and make public or interest groups aware of opportunity to fold this document into decision making														x						

Ref #	Strategy	Culture and Awareness	Intersections	Lane Departure	Unbelted	Impaired Drivers	Inattentive Drivers	Speed	Older Drivers	Younger Drivers	Motorcycles	Pedestrians	EMS and Trauma Systems	Data Management	Management Systems	Bicyclists	Commercial Vehicles	Trains	Work Zones	Unlicensed Drivers	Vehicle Safety Enhancements
211	Anticipating problems: Get ahead of the problems that we can foresee (e.g. older drivers and the growing population of them) vs. waiting to react to them.														x						
364	Consider colored bike lanes or other signing and marking in high-conflict areas															x					
365	Consider shared lane pavement markings or sharrows (bike symbol with two chevrons)															x					
3	Long term goal: vehicles that are autonomous																				x
4	Consistent in-vehicle warning systems																				x
17	Develop a suite of safety technologies (partial automation) that could be implemented in one vehicle fleet and then adopt as a model across TZD partners' fleets																				x
18	More assertive vehicle safety standards through National Highway Traffic Safety Administration																				x
19	On board screens in view of driver																				x
22	Get safety, auto manufacturing, wireless and after market technology partners to work together																				x
40	NHTSA should set standards more aggressively for in-vehicle technology, especially safety issues																				x
53	Develop a global consortium that will identify and approve new vehicle standards related to ITS so that all vehicles use same standard technologies																				x
55	Explore new, easy-to-use technologies (e.g. phone/crowd sourcing information) now vs. waiting long-term for autonomous vehicles																				x
182	After market collision avoidance systems: Issue Request for Qualification (RFQ) for after-market collision avoidance systems readily installed for reasonable costs.																				x
209	Uniformity for new technology: Ensure new technology is consistent (e.g. beeping and alerts in the vehicle) as we've done with Manual on Uniform Traffic Control Devices to create uniformity and consistency among signs and other traffic control.																				x

Appendix C: Detailed crash data and methodology for analysis

This appendix contains detailed information about the data and methodology used to analyze crashes for the SHSP. Some data analyses occurred before others during the plan development process and as such some may include data for a full year while others may only include a partial year. Crash records are stored by the Minnesota Department of Public Safety, and during the analysis period, weekly data exports of the records were sent electronically to the Minnesota Department of Transportation. For clarity, data sources are identified throughout the plan as either "Crash Facts" or "TIS Crash Data" and partial years are designated as such with the respective data extract date.

The following items are included in this appendix and are intended for those who want additional details to further analyze how many, where and what type of crashes have occurred throughout the state.

Focus Area Data Dictionary. This table identifies AASHTO emphasis areas used in the 2007 SHSP, the corresponding 2014 SHSP focus areas, and the specific variables and values used to flag crash records within the given focus area. There are differences between the emphasis areas used in the 2007 plan and the focus area defined in this plan. Modifications were made in order to more broadly capture specific, emerging traffic safety issues.

Minnesota Fatal and Serious Injury Crashes. Fatal and serious injury crash data presented in total, by system and by focus areas.

Minnesota Fatal and Serious Injury Crashes – Focus Area Correlations. Focus area crash data were analyzed for statistically significant (90 percent confidence) positive and negative correlations. Correlations were statistically large enough to rule out random variation.

Minnesota Fatal and Serious Injury Crashes by TZD Regions and Focus Areas. Regional crash data presented by TZD regions and focus areas in both number and percentage of crashes. Data was shared during 2013 TZD Regional Workshops.

Crash Projections for 2020. The following projections were completed as described to assist with setting the fatality and serious injury targets for 2020.

- Fatal and Serious Injury Crashes. Trend line presented for 2004-2012. Ranges of crash reduction presented for 2.5-5.0 percent reduction per year, 5.0-7.5 percent reduction per year, and greater than 7.5 percent reduction per year.
- Fatalities and Serious Injuries. Both three- and five-year rolling average projections are presented using a five and 10 years of data. A projection is also presented using observed data.
- Fatalities and Serious Injuries, 2013-2020. Projections presented from four- and five-point linear trend analyses.

Special Rule: Older Drivers and Pedestrians. The Federal Highway Administration also requires specific analysis of crash data to determine if traffic fatalities and serious injuries per capita for drivers and pedestrians over the age of 65 have increased during the most recent two-year period for which data are available. For Minnesota's analysis, the number of fatalities and the number of serious injuries for drivers and pedestrians age 65 and older were added together. That amount was then divided by the number of people in Minnesota who are age 65 and older, and then compared to Minnesota's total population. As instructed by Federal Highway Administration guidance, this comparison used five-year rolling average rates from 2005-2009 and 2007-2011. The calculations resulted in a decrease in the fatality and serious injury rate per capita among drivers and pedestrians over the age of 65 and as such the special rule does not apply to Minnesota.

Special Rule: High Risk Rural Roads. The Federal Highway Administration requires states to establish parameters for determining if the rural roads where crashes occur qualify as high risk rural roads. In Minnesota, a high risk rural road is functionally classified as a rural major collector, rural minor collector or a rural local road. Furthermore, the road should have a fatal and serious injury crash rate above the statewide average for similarly classified roadways or a significant increase in expected traffic volumes such that the roadway could develop a fatal and serious injury crash rate above the threshold.

These additional resources are available for further crash analysis.

Minnesota Motor Vehicle Crash Facts. Produced annually by the Minnesota Department of Public Safety, this detailed report summarizes a variety of information related to crashes on all Minnesota roads: who, what, where, when and why. In addition, it breaks out information regarding several focus areas. Available online at https://dps.mn.gov/divisions/ots/reports-statistics/Pages/crash-facts.aspx.

Minnesota Crash Statistics by County. Produced by the Minnesota Department of Public Safety, these are a series of annual fact sheets that present fatality information by county for several focus areas. Available online at https://dps.mn.gov/divisions/ots/reports-statistics/Pages/Fact-sheets.aspx.

Fatality Analysis Reporting System. Provided by the National Highway Traffic Safety Administration, FARS is a nationwide census that provides yearly data regarding fatal injuries suffered in motor vehicle traffic crashes. Available online at www.nhtsa.gov/FARS.

Statistics. Selected resources for Minnesota and national traffic safety statistics are provided by Minnesota's TZD program. Available online at www.minnesotatzd.org/topics/statistics/.

Minnesota Fatal and Serious Injury Crashes

AASHTO Emphasis Area	Minnessota Focus Area	Crash Data Query
Instituting graduated licensing for young drivers	Younger Drivers	POSITN = 01 VEHTYPE ≠ 51, 52, 53, 54 AGE ≥ 14, ≤ 20
Ensuring drivers are licensed and fully competent	Unlicensed Drivers	POSITN = 01 VEHTYPE ≠ 51, 52, 53, 54 DLSTAT = 04, 05, 06, 07, 08, 09, 90
Sustaining proficiency in older drivers	Older Drivers	POSITN = 01 VEHTYPE ≠ 51, 52, 53, 54 AGE ≥ 65, ≤ 98
Curbing aggressive driving	Speed	VEHTYPE ≠ 51, 52, 53, 54 CFCT1 = 03 CFCT2 = 03
Reducing impaired driving	Impaired Roadway Users[1]	POSITN = 01, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36 PHYSCND = 02, 03, 04, 05
Increasing seat belt usage and improving airbag effectiveness	Unbelted Occupants	VEHTYPE = 01, 02, 03, 04, 05, 06, 31, 32, 33, 34, 35, 36, 37, 38 SAFETYP = 01 or VEHTYPE = 01, 02, 03, 04, 05, 06, 31, 32, 33, 34, 35, 36, 37, 38 SAFEQP = 01 or VEHTYPE = 01, 02, 03, 04, 05, 06, 31, 32, 33, 34, 35, 36, 37, 38 SAFETYP = 02 SAFEQP ≠ 02, 04 or VEHTYPE = 01, 02, 03, 04, 05, 06, 31, 32, 33, 34, 35, 36, 37, 38 SAFETYP = 03 SAFEQP ≠ 03, 04 or VEHTYPE = 01, 02, 03, 04, 05, 06, 31, 32, 33, 34, 35, 36, 37, 38 SAFETYP = 04 SAFEQP ≠ 04 or VEHTYPE = 01, 02, 03, 04, 05, 06, 31, 32, 33, 34, 35, 36, 37, 38 AGE ≥ 1, ≤ 7 SAFETYP = 02, 03, 04 or VEHTYPE = 01, 02, 03, 04, 05, 06, 31, 32, 33, 34, 35, 36, 37, 38 AGE ≥ 1, ≤ 3 SAFETYP = 05 SAFEQP = 02, 03, 04, 05, 06, 08, 09 or VEHTYPE = 01, 02, 03, 04, 05, 06, 31, 32, 33, 34, 35, 36, 37, 38 AGE ≥ 1, ≤ 3 SAFETYP = 06 SAFEQP = 02, 03, 04, 05, 07, 08, 09,10 or VEHTYPE = 01, 02, 03, 04, 05, 06, 31, 32, 33, 34, 35, 36, 37, 38 AGE ≥ 4, ≤ 6 SAFETYP = 05 SAFEQP = 02, 03, 04, 05, 06, 07, 08, 09

AASHTO Emphasis Area	Minnesota Focus Area	Crash Data Query
Keeping drivers alert	Inattentive Drivers	VEHTYPE ≠ 51, 52, 53, 54 CFCT1 = 15, 20 CFCT2 = 15, 20 or POSITN = 01 VEHTYPE ≠ 51, 52, 53, 54 PHYSCND = 07
Increasing driver safety awareness	Traffic Safety Culture and Awareness	NOT QUANTIFIABLE IN CRASH DATA
Making walking and street crossing safer	Pedestrians	VEHTYPE = 51, 52
Ensuring safer bicycle travel	Bicyclists	VEHTYPE = 53
Improving motorcycle safety and increasing motorcycle awareness	Motorcyclists	VEHTYPE = 11, 12, 13
Making truck travel safer	Commercial Vehicles	VEHTYPE = 05, 07, 08, 31, 32, 33, 34, 35, 36, 37, 38
Reducing vehicle-train crashes	Trains	ACCTYPE = 05
Increasing safety enhancements in vehicles	Vehicle Safety Enhancements	NOT QUANTIFIABLE IN CRASH DATA
Keeping vehicles on the roadway	Lane Departure	DIAGRAM = 04, 07, 08, 09
Minimizing the consequences of leaving the road	Lane Departure	DIAGRAM = 04, 07, 08, 09
Reducing head-on and across-median crashes	Lane Departure	DIAGRAM = 04, 07, 08, 09
Improving the design and operation of highway intersections	Intersections	INTREL = 02, 03, 04, 05, 06, 07, 20, 21, 22
Designing safer work zones	Work Zones	RDWORK = 01, 02, 03, 04, 05, 90
Enhancing emergency medical capabilities to increase survivability	EMS and Trauma Systems	NOT QUANTIFIABLE IN CRASH DATA
Improving information and decision support systems	Data Management	NOT QUANTIFIABLE IN CRASH DATA
Creating more effective processes and safety management systems	Management Systems	NOT QUANTIFIABLE IN CRASH DATA

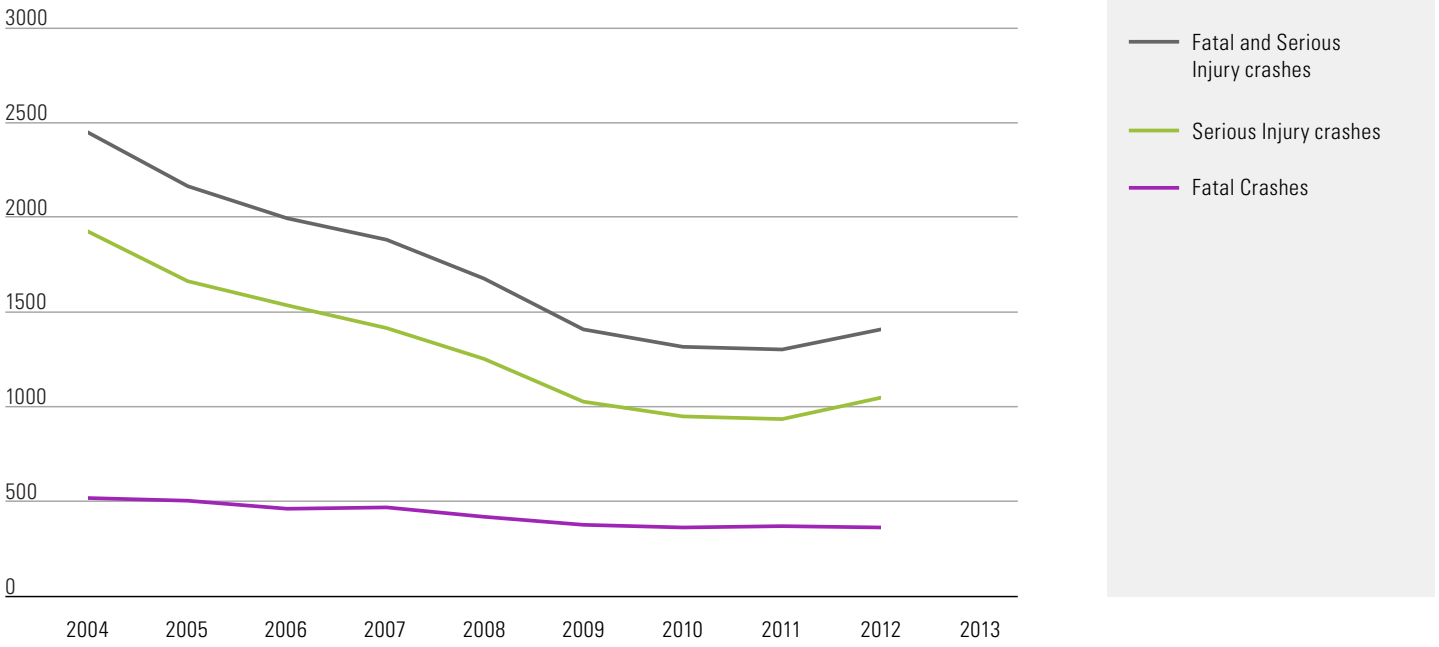
1. Impairment crashes were identified using officer observation. At time of the analyses, blood Alcohol Content was not reliably available for serious injury crashes.

Minnesota Fatal and Serious Injury Crashes

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Fatal Crashes	520	501	458	465	421	378	364	336	359
Serious Injury Crashes	1,926	1,665	1,536	1,417	1,254	1,027	950	934	1,048
Fatal + Serious Injury Crashes	2,446	2,166	1,994	1,882	1,675	1,405	1,314	1,300	1,407

TIS Crash Data, MnDOT. Oracle, 3/26/2013.

Fatal & Serious Injury Crashes

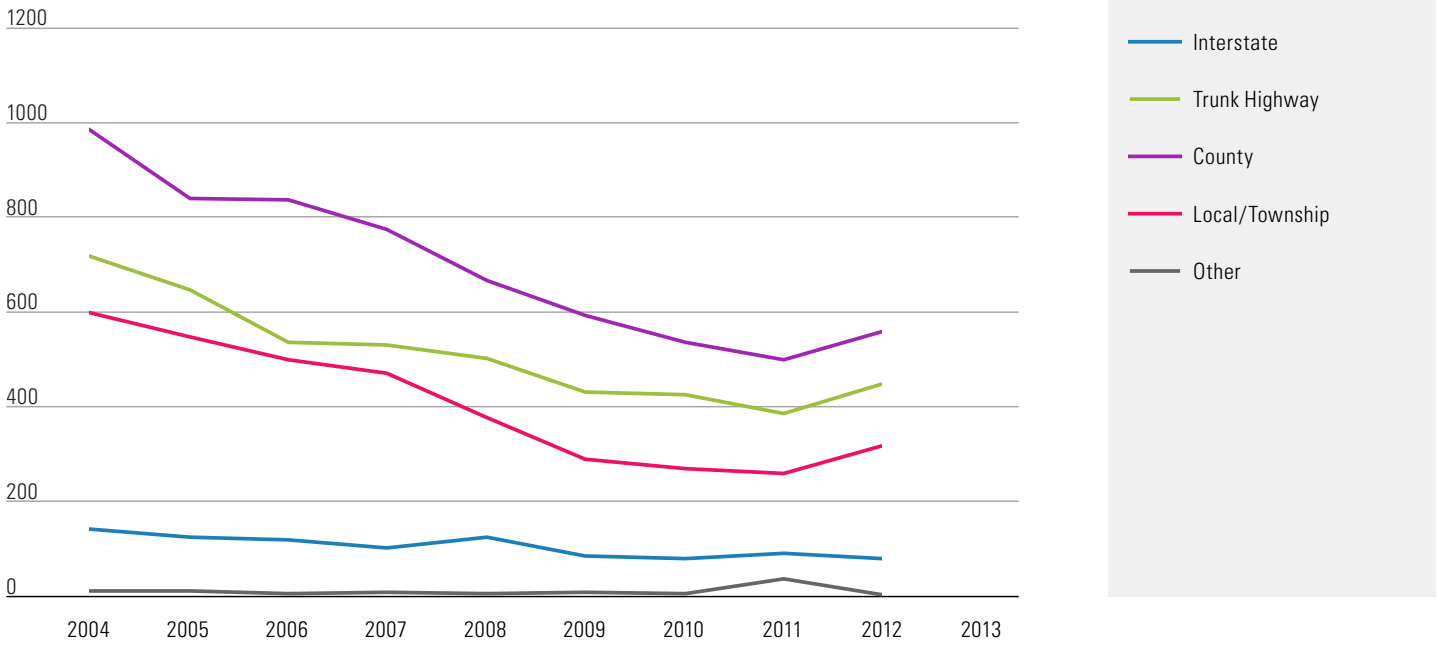


Minnesota Fatal and Serious Injury Crashes by System

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Interstate	142	125	119	103	126	86	80	92	80
Trunk Highway	715	646	536	530	501	430	424	384	448
County	980	837	833	772	665	591	536	497	557
Local / Township	597	545	499	469	376	290	269	259	318
Other	12	13	7	8	7	8	5	38	4

TIS Crash Data, MnDOT. Oracle, 3/26/2013.

Fatal & Serious Injury Crashes by System

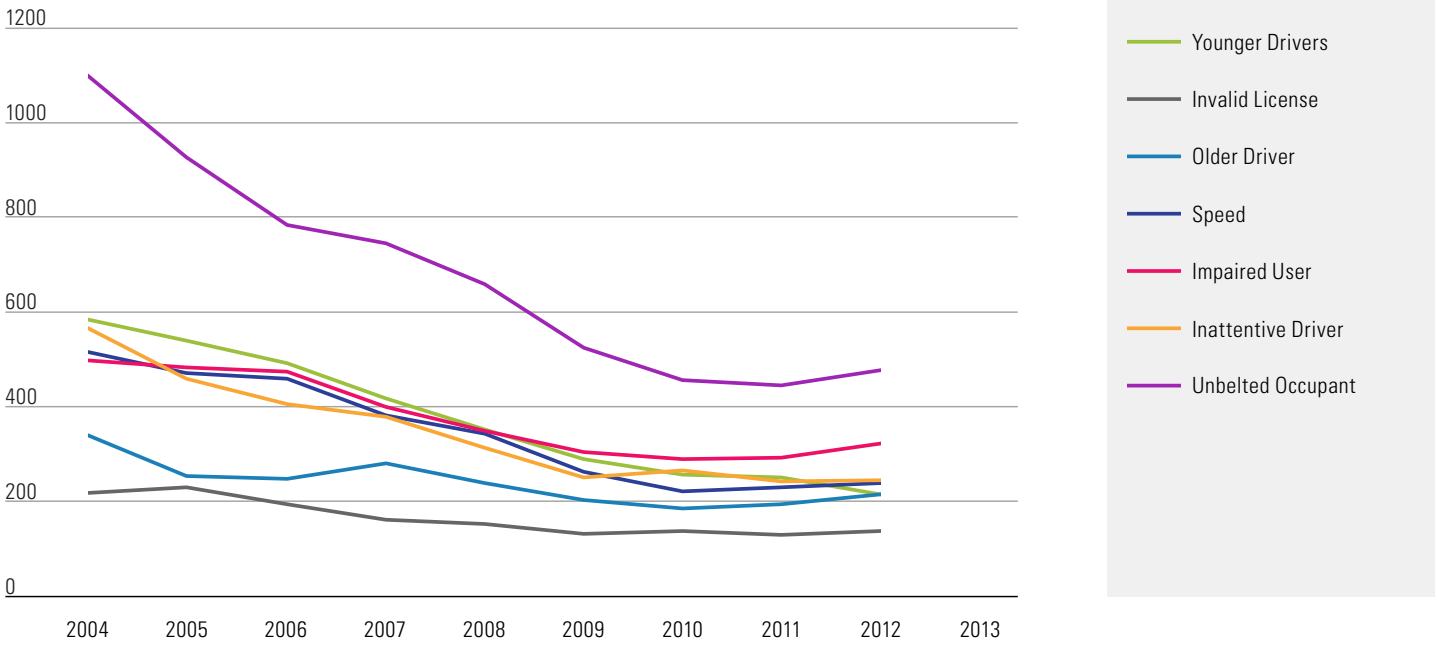


Minnesota Fatal and Serious Injury Crashes by Focus Area: Drivers

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Younger Driver	586	542	494	420	354	291	257	251	216
Invalid License	221	232	197	164	154	134	140	131	138
Older Driver	343	255	248	282	239	205	186	195	218
Speed	519	472	461	383	346	265	223	233	240
Impaired User	499	484	475	402	351	307	291	293	325
Inattentive Driver	567	462	406	381	314	251	266	244	247
Unbelted Occupant	1,102	929	786	746	661	526	459	447	479

TIS Crash Data, MnDOT. Oracle, 3/26/2013.

Fatal & Serious Injury Crashes by Focus Area: Drivers

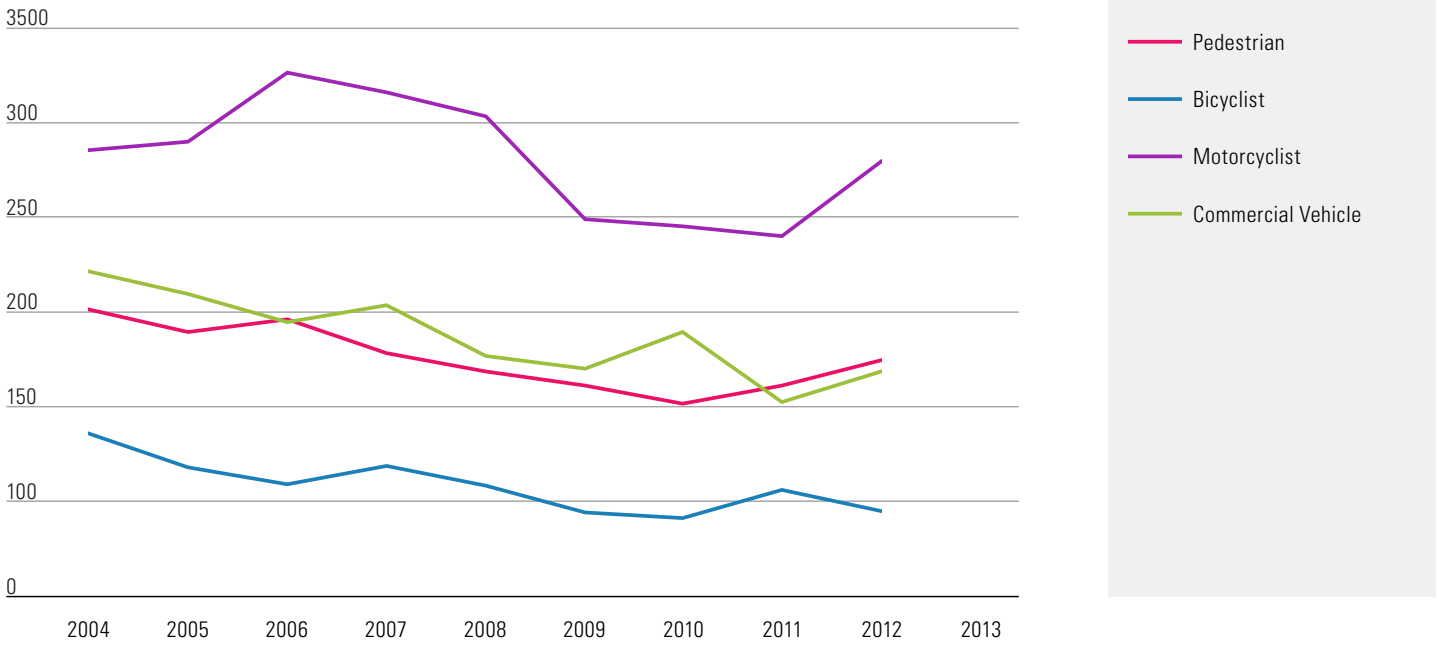


Minnesota Fatal and Serious Injury Crashes by Focus Area: Special Users and Vehicles

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Pedestrian	177	163	171	150	139	130	119	130	146
Bicyclist	101	80	69	81	68	52	48	66	53
Motorcyclist	275	281	323	311	296	233	228	222	268
Commercial Vehicle	201	187	169	180	148	141	163	120	139

TIS Crash Data, MnDOT. Oracle, 3/26/2013.

Fatal & Serious Injury Crashes by Focus Area: Special Users and Vehicles



Minnesota Fatal and Serious Injury Crashes by Focus Area: Roadways

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Train	15	13	10	5	3	6	1	7	5
Intersection	1,118	958	817	828	705	601	579	492	574
Lane Departure	1,010	897	858	803	773	630	571	598	653
Work Zone	31	31	31	34	16	26	21	23	19

TIS Crash Data, MnDOT. Oracle, 3/26/2013.

Fatal & Serious Injury Crashes by Focus Area: Roadways

Minnesota Fatal and Serious Injury Crashes - Focus Area Correlations

		Impaired Driver	Speed-related	Inattentive Driver	Unbelted Occupant	Invalid Licensed Driver	Younger Driver	Older Driver	Pedestrian	Bicyclist	Motorcyclist	Commercial Vehicle	Train-related	Intersection-related	Lane Departure	Work Zone
Impaired Driver	Correlation	+1.000	+0.185	-0.093	+0.205	+0.173	-0.060	-0.159	-0.006	-0.065	-0.038	-0.126	-0.030	-0.108	+0.203	+0.005
	Significance		.000	.000	.000	.000	.000	.000	.613	.000	.001	.000	.012	.000	.000	.682
Speed-related	Correlation	+0.185	+1.000	-0.138	+0.145	+0.114	+0.046	-0.119	-0.111	-0.089	+0.007	-0.044	-0.027	-0.096	+0.159	+0.023
	Significance	.000		.000	.000	.000	.000	.000	.000	.000	.546	.000	.025	.000	.000	.054
Inattentive Driver	Correlation	-0.093	-0.138	+1.000	-0.004	-0.033	+0.031	+0.042	-0.001	-0.023	-0.051	+0.047	+0.012	+0.041	-0.064	+0.037
	Significance	.000	.000		.710	.005	.009	.000	.905	.050	.000	.000	.301	.000	.000	.002
Unbelted Occupant	Correlation	+0.205	+0.145	-0.004	+1.000	+0.105	+0.063	-0.053	-0.142	-0.096	-0.233	-0.006	+0.011	-0.047	+0.174	-0.017
	Significance	.000	.000	.710		.000	.000	.000	.000	.000	.000	.586	.375	.000	.000	.142
Invalid Licensed Driver	Correlation	+0.173	+0.114	-0.033	+0.105	+1.000	-0.042	-0.073	-0.051	-0.046	+0.050	-0.027	-0.010	-0.030	+0.042	-0.005
	Significance	.000	.000	.005	.000		.000	.000	.000	.000	.000	.023	.403	.012	.000	.656
Younger Driver	Correlation	-0.060	+0.046	+0.031	+0.063	-0.042	+1.000	-0.080	-0.064	-0.045	-0.099	-0.048	-0.008	+0.022	-0.019	-0.025
	Significance	.000	.000	.009	.000	.000		.000	.000	.000	.000	.000	.496	.070	.111	.038
Older Driver	Correlation	-0.159	-0.119	+0.042	-0.053	-0.073	-0.080	+1.000	-0.046	-0.031	-0.056	+0.076	+0.013	+0.085	-0.073	+0.012
	Significance	.000	.000	.000	.000	.000	.000		.000	.009	.000	.000	.291	.000	.000	.330
Pedestrian	Correlation	-0.006	-0.111	-0.001	-0.142	-0.051	-0.064	-0.046	+1.000	-0.064	-0.138	-0.021	-0.018	+0.057	-0.132	+0.013
	Significance	.613	.000	.905	.000	.000	.000	.000		.000	.000	.084	.130	.000	.000	.290
Bicyclist	Correlation	-0.065	-0.089	-0.023	-0.096	-0.046	-0.045	-0.031	-0.064	+1.000	-0.084	-0.021	-0.011	+0.104	-0.138	-0.007
	Significance	.000	.000	.050	.000	.000	.000	.009	.000		.000	.076	.334	.000	.000	.530
Motorcyclist	Correlation	-0.038	+0.007	-0.051	-0.233	+0.050	-0.099	-0.056	-0.138	-0.084	+1.000	-0.115	-0.026	+0.000	-0.066	+0.008
	Significance	.001	.546	.000	.000	.000	.000	.000	.000	.000		.000	.030	.971	.000	.522
Commercial Vehicle	Correlation	-0.126	-0.044	+0.047	-0.006	-0.027	-0.048	+0.076	-0.021	-0.021	-0.115	+1.000	+0.049	+0.057	-0.097	+0.060
	Significance	.000	.000	.000	.586	.023	.000	.000	.084	.076	.000		.000	.000	.000	.000
Train-related	Correlation	-0.030	-0.027	+0.012	+0.011	-0.010	-0.008	+0.013	-0.018	-0.011	-0.026	+0.049	+1.000	-0.011	-0.041	-0.007
	Significance	.012	.025	.301	.375	.403	.496	.291	.130	.334	.030	.000		.345	.001	.564
Intersection-related	Correlation	-0.108	-0.096	+0.041	-0.047	-0.030	+0.022	+0.085	+0.057	+0.104	+0.000	+0.057	-0.011	+1.000	-0.374	-0.004
	Significance	.000	.000	.000	.000	.012	.070	.000	.000	.000	.971	.000	.345		.000	.717
Lane Departure	Correlation	+0.203	+0.159	-0.064	+0.174	+0.042	-0.019	-0.073	-0.132	-0.138	-0.066	-0.097	-0.041	-0.374	+1.000	-0.058
	Significance	.000	.000	.000	.000	.000	.111	.000	.000	.000	.000	.000	.001	.000		.000
Work Zone	Correlation	+0.005	+0.023	+0.037	-0.017	-0.005	-0.025	+0.012	+0.013	-0.007	+0.008	+0.060	-0.007	-0.004	-0.058	+1.000
	Significance	.682	.054	.002	.142	.656	.038	.330	.290	.530	.522	.000	.564	.717	.000	

TIS Crash Data, MnDOT. Oracle, 3/26/13.

Summary of Pearson correlation coefficient for each focus area. The correlation coefficient is a measure of linear dependence between the two focus areas, ranging from -1 to +1. Perfect correlation implies that every situation where one crash occurs, the other is always involved (+1.000) or never involved (-1.000). A positive value indicates that the crash types tend to occur together; a negative value indicates the presence of one crash type tends to occur when the other is not present. The two-tailed significance reports measures the statistical confidence in the correlation from 0 to 1. Values less than or equal to 0.100 (90% confidence) are reported as statistically significant, ruling out random variation. Statewide fatal and serious injury crashes from 2008 to prelminary 2012 data used.

Minnesota Fatal and Serious Injury Crashes by TZD Regions and Focus Areas

	Statewide	Northeast	Northwest	East Central	West Central	Southeast	South Central	Southwest	Metro
Total	7,071	664	312	962	458	844	535	449	2,802
Impaired Driver	1,567	193	98	235	111	173	117	104	524
Speed-related	1,307	147	50	195	96	167	101	69	474
Inattentive Driver	1,322	122	52	198	85	173	106	94	483
Unbelted Occupant	2,572	257	169	377	193	311	223	224	798
Invalid Licensed Driver	697	93	34	98	42	71	38	45	271
Younger Driver	1,369	122	68	209	77	178	99	115	494
Older Driver	1,043	103	57	147	86	130	96	79	335
Pedestrian	664	47	11	67	17	58	31	19	411
Bicyclist	287	12	5	21	9	26	11	9	194
Motorcyclist	1,247	121	34	190	74	156	95	58	519
Commercial Vehicle	711	51	37	77	64	94	90	68	223
Train-related	22	4	3	3	2	3	4	2	1
Intersection-related	2,951	239	114	341	161	299	187	172	1,421
Lane Departure	3,225	348	167	522	247	449	291	236	945
Work Zone	105	18	3	7	3	13	4	2	55

	Statewide	Northeast	Northwest	East Central	West Central	Southeast	South Central	Southwest	Metro
Total	7,071	664	312	962	458	844	535	449	2,802
Impaired Driver	22%	29%	31%	24%	24%	20%	22%	23%	19%
Speed-related	18%	22%	16%	20%	21%	20%	19%	15%	17%
Inattentive Driver	19%	18%	17%	21%	19%	20%	20%	21%	17%
Unbelted Occupant	36%	39%	54%	39%	42%	37%	42%	50%	28%
Invalid Licensed Driver	10%	14%	11%	10%	9%	8%	7%	10%	10%
Younger Driver	19%	18%	22%	22%	17%	21%	19%	26%	18%
Older Driver	15%	16%	18%	15%	19%	15%	18%	18%	12%
Pedestrian	9%	7%	4%	7%	4%	7%	6%	4%	15%
Bicyclist	4%	2%	2%	2%	2%	3%	2%	2%	7%
Motorcyclist	18%	18%	11%	20%	16%	18%	18%	13%	19%
Commercial Vehicle	10%	8%	12%	8%	14%	11%	17%	15%	8%
Train-related	0%	1%	1%	0%	0%	0%	1%	0%	0%
Intersection-related	42%	36%	37%	35%	35%	35%	35%	38%	51%
Lane Departure	46%	52%	54%	54%	54%	53%	54%	53%	34%
Work Zone	1%	3%	1%	1%	1%	2%	1%	0%	2%

TIS Crash Data, MnDOT. Oracle, 3/26/2013.

Summary of fatal and serious injury crashes on all roadways from 2008 to 2012 by number and percentage among TZD Regions. Data are preliminary for 2012. Full location data were not available for as many as 45 crashes. Data are presented as they appeared at the time of analysis. Geographically, each TZD region was compared to the statewide average by the percent crashes in each focus area. Focus areas are defined according to the standard definitions in the SHSP. All person level focus areas are aggregated to the crash level and some crashes may involve multiple categories. For example, a crash involving one driver under 20 and one over 65 is flagged as both a younger driver and an older driver crash.

Minnesota Counties within TZD Regions

Northeast	Northwest	East Central	West Central	Southeast	South Central	Southwest	Metro
Aitkin	Beltrami	Benton	Becker	Dodge	Blue Earth	Big Stone	Anoka
Carlton	Clearwater	Cass	Clay	Fillmore	Brown	Chippewa	Carver
Cook	Hubbard	Crow Wing	Douglas	Freeborn	Cottonwood	Kandiyohi	Chisago
Itasca	Kittson	Isanti	Grant	Goodhue	Faribault	Lac qui Parle	Dakota
Koochiching	Lake of the Woods	Kanabec	Mahnomen	Houston	Jackson	Lincoln	Hennepin
Lake	Marshall	Mille Lacs	Otter Tail	Mower	Le Sueur	Lyon	Ramsey
Pine	Norman	Morrison	Pope	Olmsted	Martin	McLeod	Scott
St Louis	Pennington	Sherburne	Stevens	Rice	Nicollet	Meeker	Washington
	Polk	Stearns	Traverse	Steele	Nobles	Murray	
	Red Lake	Todd	Wilkin	Wabasha	Rock	Pipestone	
	Rouseau	Wadena		Winona	Sibley	Redwood	
		Wright			Waseca	Renville	
					Watonwan	Swift	
						Yellow Medicine	

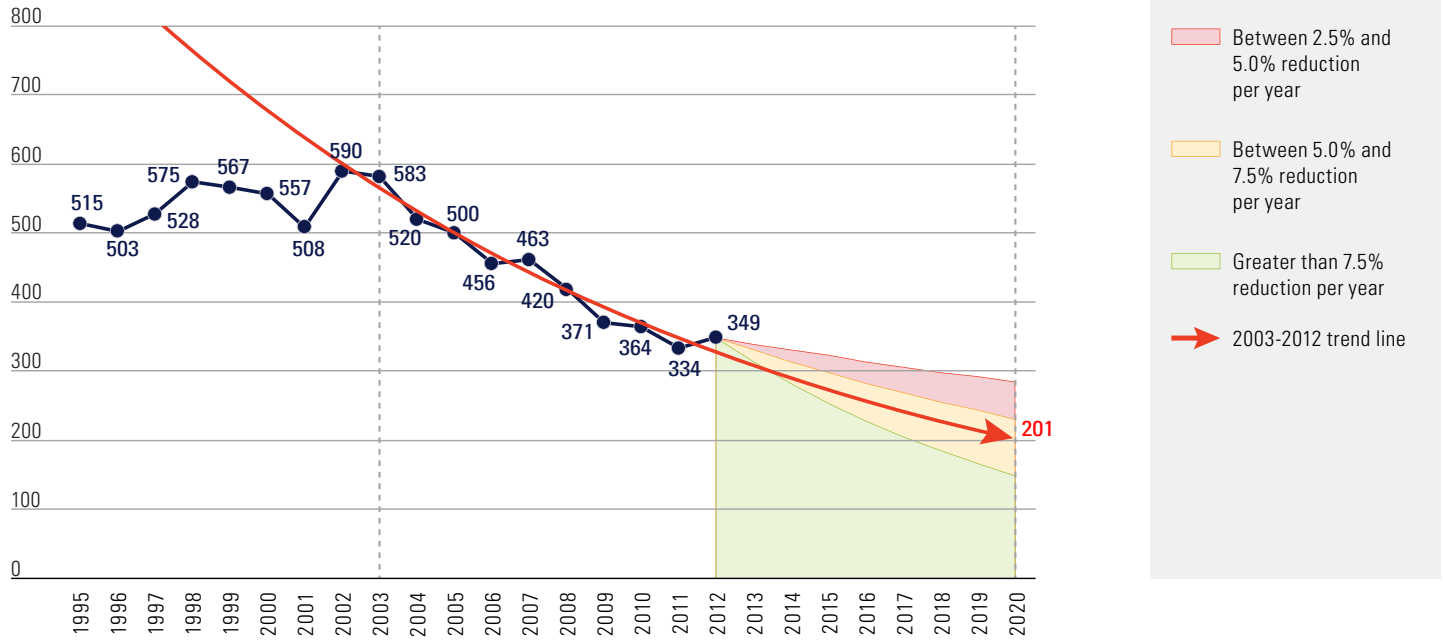
Summary of the counties that comprise each TZD Region in Minnesota.

Crash Projections: Fatal Crashes

Year	K Crashes	2003-2012 Exponential Trend	Between 2.5% and 5.0% reduction per year	Between 5.0% and 7.5% reduction per year	Greater than 7.5% reduction per year
1995	515	-			
1996	503	-			
1997	528	-			
1998	575	-			
1999	567	-			
2000	557	-			
2001	508	-			
2002	590	-			
2003	583	563.9			
2004	520	530.7			
2005	500	499.4			
2006	456	470			
2007	463	442.3			
2008	420	416.3			
2009	371	391.7			
2010	364	368.6			
2011	334	346.9			
2012	349	326.5	349.0	349.0	349.0
2013		307.2	340.3	331.6	314.1
2014		289.1	331.8	315.0	282.7
2015		272.1	323.5	299.2	254.4
2016		256.1	315.4	284.3	229.0
2017		241	307.5	270.0	206.1
2018		226.8	299.8	256.5	185.5
2019		213.4	292.3	243.7	166.9
2020		200.8	285.0	231.5	150.2

Minnesota Department of Public Safety. Minnesota Motor Vehicle Crash Facts.

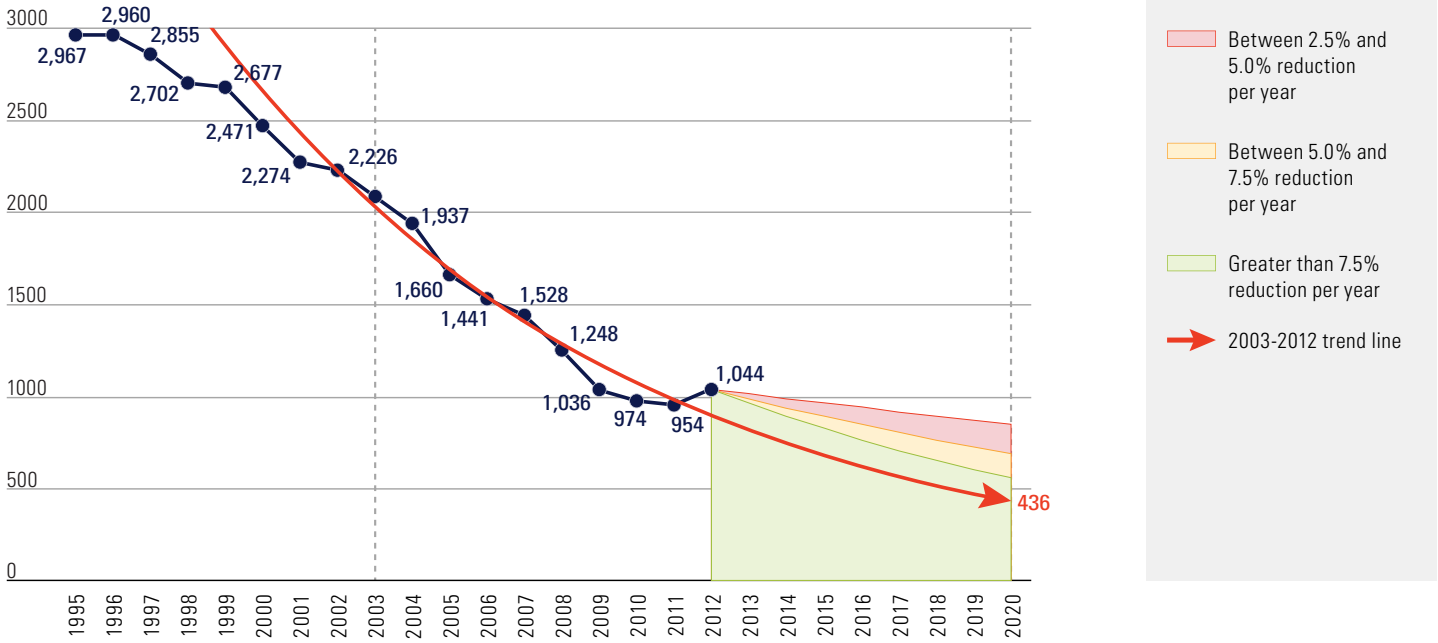
Fatal Crashes, All Roadways



Crash Projections: Serious Injury Crashes

Year	Serious Injury Crashes	2004-2012 Exponential Trend	Between 2.5% and 5.0% reduction per year	Between 5.0% and 7.5% reduction per year	Greater than 7.5% reduction per year
1995	2967	-			
1996	2960	-			
1997	2855	-			
1998	2702	-			
1999	2677	-			
2000	2471	-			
2001	2274	-			
2002	2226	-			
2003	2081.5	< No Data >			
2004	1937	1,822.6			
2005	1660	1,666.7			
2006	1528	1,524.2			
2007	1441	1,393.8			
2008	1248	1,274.6			
2009	1036	1,165.6			
2010	974	1,065.9			
2011	954	974.7			
2012	1044	891.4	1,044.0	1,044.0	1,044.0
2013		815.1	1,017.9	991.8	965.7
2014		745.4	992.5	942.2	893.3
2015		681.7	967.6	895.1	826.3
2016		623.4	943.5	850.3	764.3
2017		570.0	919.9	807.8	707.0
2018		521.3	896.9	767.4	654.0
2019		476.7	874.4	729.1	604.9
2020		435.9	852.6	692.6	559.5

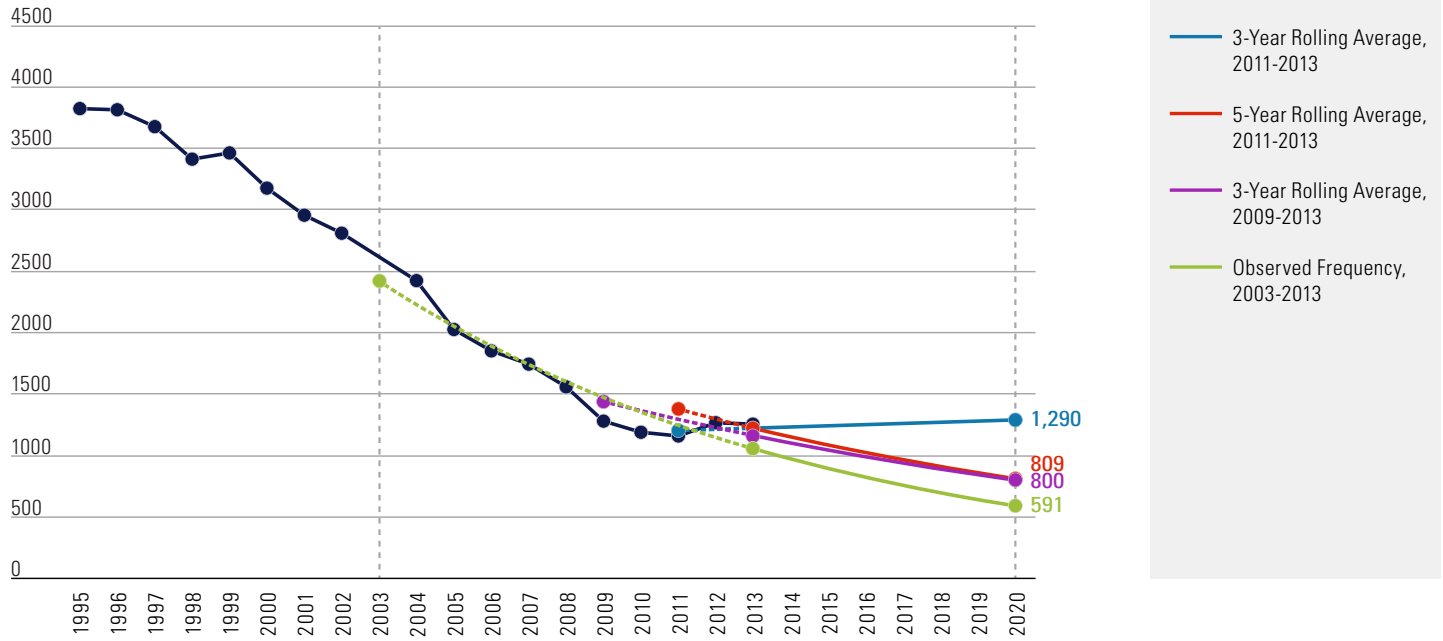
Serious Injury Crashes, All Roadways



Crash Projections: Fatalities

Year	Fatalities	3-year Average	5-year Average	3-Year Rolling Avg, 2011-2013	5-year Rolling Avg., 2011-2013	3-year Rolling Avg., 2009-2013	Observed Frequency, 2003-2013
1995	597	-	-	-	-	-	-
1996	576	-	-	-	-	-	-
1997	600	591.0	-	-	-	-	-
1998	650	608.7	-	-	-	-	-
1999	626	625.3	609.8	-	-	-	-
2000	625	633.7	615.4	-	-	-	-
2001	568	606.3	613.8	-	-	-	-
2002	657	616.7	625.2	-	-	-	-
2003	655	626.7	626.2	-	-	-	611.1
2004	567	626.3	614.4	-	-	-	579.1
2005	559	593.7	601.2	-	-	-	548.8
2006	494	540.0	586.4	-	-	-	520.0
2007	510	521.0	557.0	-	-	-	492.8
2008	455	486.3	517.0	-	-	-	467.0
2009	421	462.0	487.8	-	-	452.5	442.6
2010	411	429.0	458.2	-	-	431.8	419.4
2011	368	400.0	433.0	400.0	432.6	412.0	397.4
2012	395	391.3	410.0	391.3	412.7	393.1	376.6
2013	385	382.7	396.0	382.7	394.7	375.1	356.9
2014				374.3	377.5	358.0	338.2
2015				366.1	361.0	341.6	320.5
2016				358.1	345.2	325.9	303.7
2017				350.2	330.1	311.0	287.8
2018				342.6	315.7	296.8	272.7
2019				335.1	301.9	283.2	258.4
2020				327.7	288.7	270.2	244.9

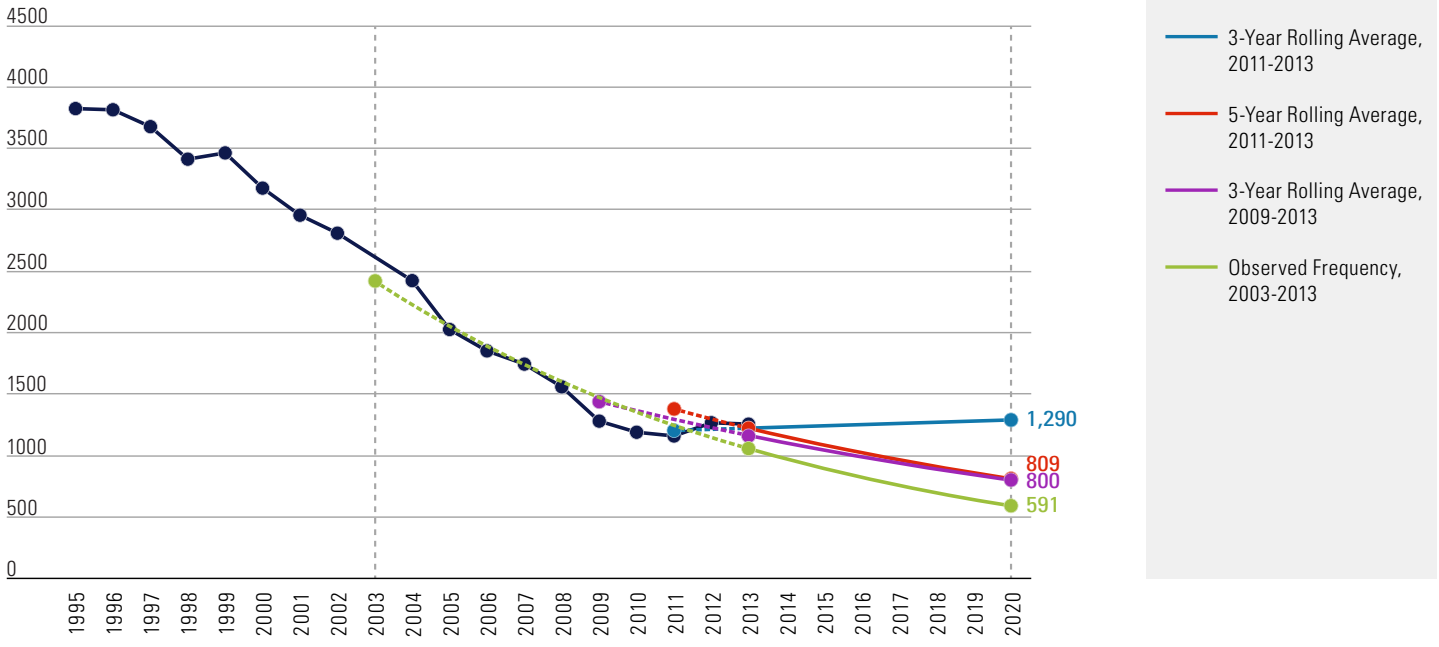
Serious Injuries, All Roadways



Crash Projections: Serious Injuries

Year	Serious Injuries	3-year Average	5-year Average	3-year Rolling Avg., 2011-2013	5-year Rolling Avg., 2011-2013	3-year Rolling Avg., 2009-2013	Observed Frequency, 2003-2013
1995	3826	-	-	-	-	-	-
1996	3813	-	-	-	-	-	-
1997	3673	3,770.7	-	-	-	-	-
1998	3409	3,631.7	-	-	-	-	-
1999	3460	3,514.0	3,636.2	-	-	-	-
2000	3174	3,347.7	3,505.8	-	-	-	-
2001	2949	3,194.3	3,333.0	-	-	-	-
2002	2807	2,976.7	3,159.8	-	-	-	-
2003	<No Data>	2,790.5	3,001.1	-	-	-	2,424.8
2004	2424	2,615.5	2,793.9	-	-	-	2,231.6
2005	2019	2,352.8	2,562.9	-	-	-	2,053.7
2006	1844	2,095.7	2,341.9	-	-	-	1,890.1
2007	1736	1,866.3	2,127.7	-	-	-	1,739.5
2008	1553	1,711.0	1,915.2	-	-	-	1,600.9
2009	1271	1,520.0	1,684.6	-	-	1,440.1	1,473.3
2010	1191	1,338.3	1,519.0	-	-	1,365.2	1,355.9
2011	1159	1,207.0	1,382.0	1,203.6	1,377.0	1,294.1	1,247.8
2012	1268	1,206.0	1,288.4	1,212.9	1,297.9	1,226.7	1,148.4
2013	1250	1,225.7	1,227.8	1,222.2	1,223.3	1,162.9	1,056.9
2014				1,231.6	1,153.1	1,102.3	972.7
2015				1,241.1	1,086.8	1,045.0	895.2
2016				1,250.7	1,024.4	990.6	823.8
2017				1,260.3	965.6	939.0	758.2
2018				1,270.0	910.1	890.1	697.8
2019				1,279.8	857.8	843.8	642.2
2020				1,289.6	808.6	799.9	591.0

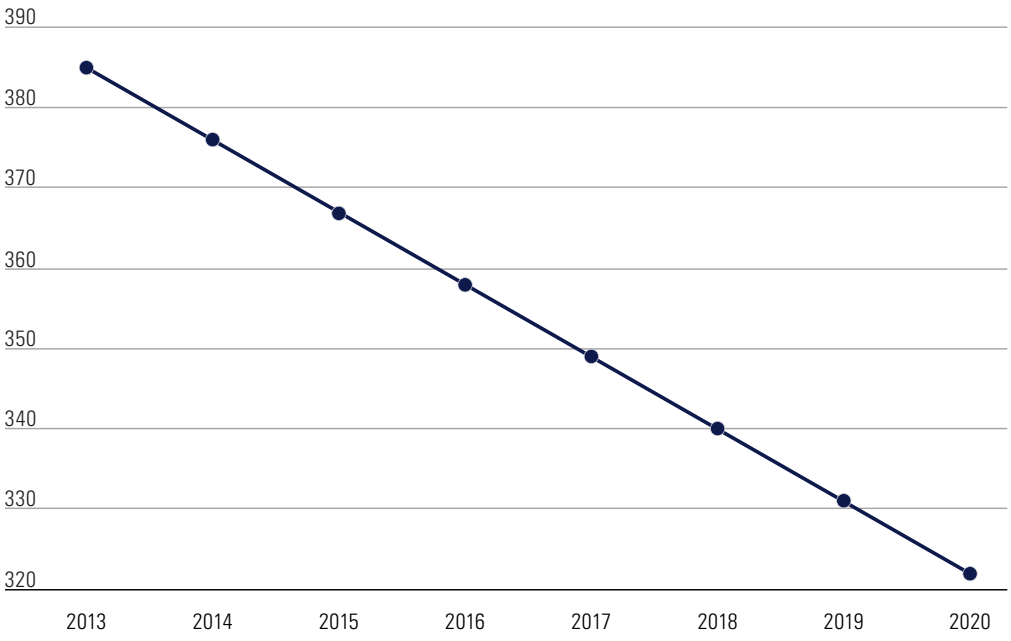
Serious Injuries, All Roadways



Crash Projection: Fatalities, 2013-2020

Year	Fatalities
2013	385
2014	376
2015	367
2016	358
2017	349
2018	340
2019	331
2020	322

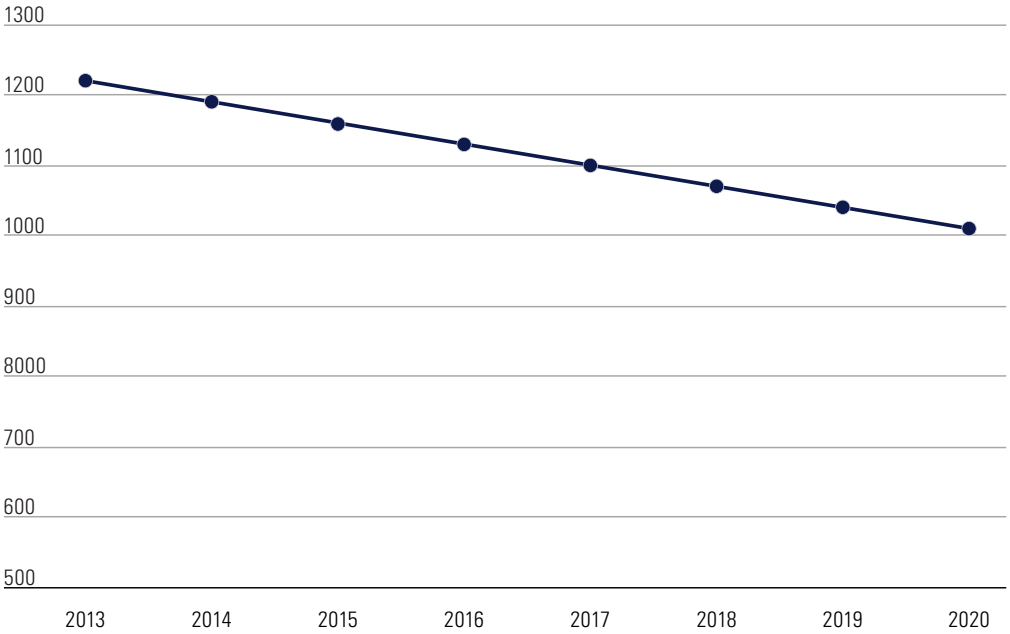
Crash Projection: Fatalities, 2013-2020



Crash Projection: Serious Injuries, 2013-2020

Year	Serious Injuries
2013	1220
2014	1190
2015	1160
2016	1130
2017	1100
2018	1070
2019	1040
2020	1010

Crash Projection: Serious Injuries, 2013-2020



Special Rule: Older Drivers and Pedestrians

Year	Minnesota Population Over 65	Minnesota Total Population	Population Over 65 Per Thousand Total Population	Older Fatalities and Serious Injuries	Driver Fatality Age 65-98	Driver Serious Injuries Age 65-98	Pedestrian Fatality Age 65-98	Pedestrian Serious Injuries Age 65-98	Fatality Rate (per capita)	Serious Injury Rate (per capita)	Fatality & Serious Injury Rate (per capita)
2004	570,000	4,624,000	123	232	70	139	10	13	-	-	-
2005	577,318	4,989,848	116	175	49	98	10	18	-	-	-
2006	628,105	5,167,101	122	158	57	78	8	15	-	-	-
2007	635,764	5,197,621	122	187	75	88	8	16	-	-	-
2008	651,154	5,220,393	125	165	61	81	6	17	0.6	0.9	1.5
2009	669,290	5,266,215	127	142	49	71	9	13	0.5	0.8	1.4
2010	686,694	5,310,584	129	139	43	72	8	16	0.5	0.7	1.3
2011	701,083	5,344,861	131	142	49	70	12	11	0.5	0.7	1.2
2012	729,767	5,379,139	136	151	48	80	11	12	0.5	0.7	1.1