4.0 Safety Analysis

This chapter summarizes the processes, results, and recommendations of the safety analysis on the Anoka County roadway network. The Safety Plan was developed using a process that is consistent with national guidelines established by the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA). The process began with an analysis of crash data for Anoka County and was followed with the adoption of a county safety goal, the identification of the high-priority safety emphasis areas, and safety mitigation strategies.

In addition to setting the direction for the county's safety improvement activities, the analysis identified high-incident crash locations, which were incorporated into the evaluation process (see Section 7.0). The final step in the safety planning process involves the identification of safety projects—specific safety strategies proposed for implementation at specific locations. This step requires additional detailed studies that when completed will be documented in a supplemental report that will be appended to this Plan.

4.1 Commitment to Safety

The Anoka County Highway Department's vision is to enhance and protect life by providing safe roads and eliminating congestion. The county's culture—which emphasizes safety—recognizes that a safe and efficient transportation system is essential for the traveling public, as well as for communities and businesses. The county decided to advance this culture by taking a structured approach towards improving safety. The decision was made in part because when compared to other Minnesota Counties, Anoka County has the third highest traffic fatality count in the state.[1] Safety is a common theme throughout the Plan. Figure 4-1 provides an overview of the elements included in the county's approach to safety:

FIGURE 4-1
Anoka County's Overall Approach to Highway Safety

[1] Source: Minnesota Strategic Highway Safety Plan (SHSP), June 30, 2007. One hundred thirty-three (133) traffic fatalities occurred in Anoka County during the time period 2001–2005. With 288 fatalities between 2001 and 2005, Hennepin County ranked first and Ramsey County ranked second, with 142 fatalities.

4.2 Crash Data-Driven Analysis

In Minnesota, four of the five counties with the highest number of traffic fatalities from 2001 to 2005 were in the seven-county Twin Cities Metropolitan Area. However, throughout Minnesota, 72 percent of fatalities occurred in rural areas. Because of the overrepresentation of rural fatal crashes within the state, the Minnesota State Highway Safety Plan (SHSP) focuses heavily on addressing rural crashes.

Generally, the type and frequency of severe crashes differs between rural and urban areas. On high-speed rural highways, there is typically a higher percentage of fatal road departure crashes. In urban areas, severe crashes at intersections—particularly signalized intersections—and pedestrian fatalities are more prevalent than in rural areas.

As noted in Section 1.3, the southern portion of Anoka County is primarily urban, while the northern half is primarily rural. Based on the different characteristics of rural and urban fatal crashes, Anoka County determined that it was necessary to carry out a county-specific, data-driven process to identify the locations of greatest concern, and to isolate patterns of fatal crashes. Awareness of these differences and use of county-specific crash data resulted in the selection and implementation of safety strategies with the greatest potential for reducing fatal crashes.

4.3 National and State Models

4.3.1 SAFETEA-LU

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) is the current federal law governing surface transportation programs. As the name suggests, SAFETEA-LU includes several important safety requirements, including that all states must develop Strategic Highway Safety Plans.

4.3.2 Critical Emphasis Areas from AASHTO and MN Strategic Highway Safety Plans

AASHTO published a nationally focused SHSP in 1997, along with an update in 2004. The SHSP focused on 22 specific highway safety challenges, or Critical Emphasis Areas (CEAs), that are divided into six parts or categories (see Table 4-1). Each CEA includes strategies for addressing a particular type of fatal crash.

Analyzing crash records and identifying crash characteristics allows for categorization within the CEAs listed in Table 4-1. This step helps select effective strategies for reducing crashes and assists with determining where limited highway and safety improvements funds should be invested to have the most positive impact.

AASHTO's SHSP and Implementation Guides were used to develop the Minnesota SHSP, which was initially published in 2004, and updated in 2007. The Minnesota SHSP includes tools developed to facilitate implementation and provide state and local transportation agencies a blueprint for developing their own customized highway safety plans. AASHTO's and Mn/DOT's processes were used to guide development of Anoka County's SHSP as well.

Both the national and state safety plans were developed with a variety of stakeholders from public and private agencies. This stakeholder involvement acknowledges that maintaining and improving a safe transportation system can only be achieved through combined efforts of a variety of stakeholders. Anoka County has worked with a variety of agencies in the past, and is committed to expanding the group of stakeholders as the county moves the safety planning process forward.

TABLE 4-1
AASHTO State Highway Safety Plan Critical Emphasis Areas

Part 1: Drivers	**Part 4: Highways**
1. Instituting Graduated Licensing for Young Drivers	14. Reducing Vehicle-Train Crashes
2. Ensuring Drivers are Licensed and Fully Competent	15. Keeping Vehicles on the Roadway
3. Sustaining Proficiency in Older Drivers	16. Minimizing the Consequences of Leaving the Road
4. Curbing Aggressive Driving	17. Improving the Design and Operation of Highway Intersections
5. Reducing Impaired Driving	18. Reducing Head-On and Across Median Crashes
6. Keeping Drivers Alert	19. Designing Safer Work Zones
7. Increasing Driver Safety Awareness	**Part 5: Emergency Medical Services**
8. Increasing Seat Belt Usage	20. Enhancing Emergency Medical Capabilities to Increase Survivability
Part 2: Special Users	**Part 6: Management**
9. Making Walking and Street Crossing Safe	21. Improving Information and Decision Support Systems
10. Ensuring Safer Bicycle Travel	22. Creating More Effective Processes and Safety Management Systems
Part 3: Vehicles	
11. Improving Motorcycle Safety and Increasing Motorcycle Awareness	
12. Making Truck Travel Safer	
13. Increasing Safety Enhancements in Vehicles	

Source: American Association of State Highway and Transportation Officials (AASHTO) Strategic Highway Safety Plan (SHSP), 1997.

National Cooperative Highway Research Program Report 500 Series

The National Cooperative Highway Research Program (NCHRP) is developing a series of guides that correspond to the above listed CEAs. These guides are intended to assist state and local agencies, including Anoka County, reduce traffic-related fatalities and injuries. This effort is part of NCHRP Project 17-18(3); Report 500 series. Each guide includes a

description of the problem, strategies for addressing the problem, and model implementation processes.

4.4 Objectives

Anoka County's SHSP is aimed at meeting five objectives:

1. To be consistent with and an extension of federal and state initiatives [AASHTO's SHSP (1997), the NCHRP's Report 500 Series (ongoing), and the Minnesota SHSP (revised, 2007)].
2. To be data-driven, based on Anoka County crash statistics.
3. To involve Education, Enforcement, Engineering, and Emergency Medical Services (EMS)—the Four Es of traffic safety.
4. To consider all roads in Anoka County when setting the traffic safety goal.
5. To consider only Anoka's County State Aid Highways (CSAH) and County Roads (CR) when selecting the CEAs, identifying Critical Strategies, and identifying high-crash locations for Anoka County.

The county plans to develop a project-specific five year safety program to implement the recommendations of this Transportation Plan.

4.5 Anoka County Traffic Safety Goals

4.5.1 Reduce Fatalities

Anoka County adopted a goal of reducing traffic fatalities within the county by 19 percent by the year 2010. This is consistent with the goal adopted for the Minnesota SHSP (see Figure 4-2).[2] The county's goal is to reduce yearly traffic fatalities from 29 in 2006 to 23 or fewer by 2010.

Crash severity is generally categorized into property damage, injury crashes, or fatal crashes. While there is a desire to prevent all crashes, the county recognizes that certain crash types—specifically fatal and serious injury crashes—have the most impact on those involved, and on their families and friends.

The locations of fatal (2002–2006) and serious injury crashes that occurred in Anoka County (2002–2005)[3] are shown in Figure 4-3. Serious injury crashes would be expected to decrease through measures taken to address fatal crashes and high-incident crash locations, which are discussed below.

[2] Minnesota's Safety Partners created a Toward Zero Deaths initiative where the ultimate goal is to eliminate all traffic fatalities in the state. The Minnesota SHSP adopted an interim goal to reduce traffic fatalities to 400 or fewer by 2010, down from 494 traffic fatalities in 2006; approximately a 19 percent reduction in traffic fatalities.

[3] Serious injury crash data for 2006 was unavailable when this analysis was conducted.

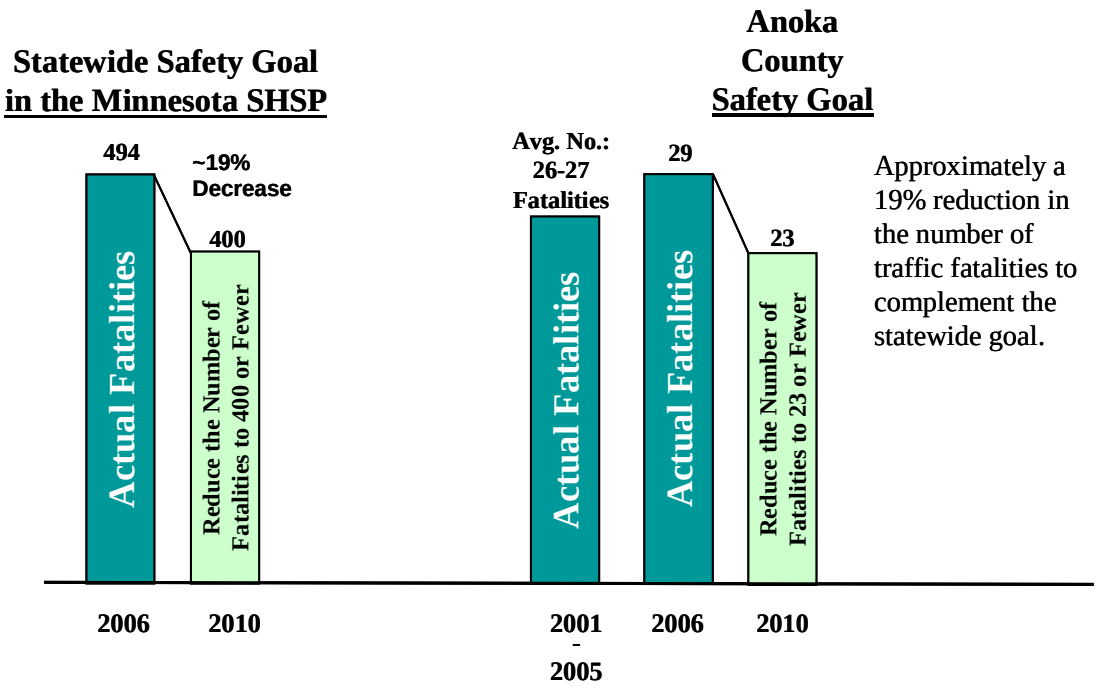


FIGURE 4-2
Anoka County and Minnesota Traffic Safety Goal

4.5.2 Address High-Incident Crash Locations (>10 Crashes, 2002–2006)

Anoka County's safety program includes addressing high-incident crash locations, or locations in the county where ten or more crashes occurred from 2002 to 2006, shown in Figure 4-4. High-incident crash locations include crashes of all severity types, from fatalities to property damage only.

4.6 Assumptions

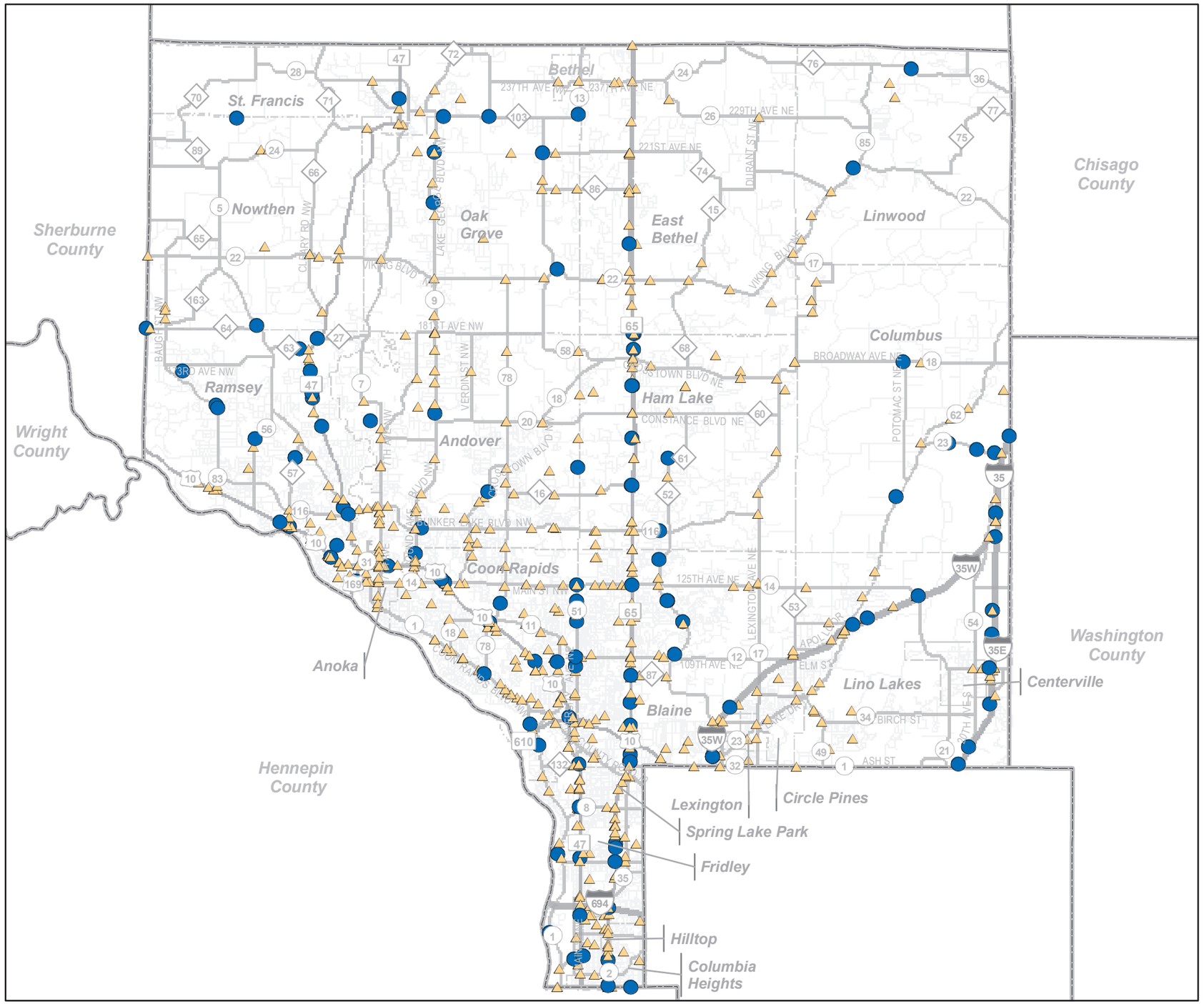
Assumptions on which the strategic countywide safety analysis is based are documented below.

4.6.1 Years Included in Analysis

Data from the five most recent years for which crash data was available, 2002–2006, were used in the analysis, with the exception of serious injury crash data. That data was available only for 2002–2005. Data used for the crash analysis was provided by the Minnesota Department of Public Safety's Crash Records.

4.6.2 Roadways within County Included in Analysis

Traffic safety is a universal concern for Anoka County residents and commuters, regardless of roadway jurisdiction. In reality, however, the county has jurisdiction over county roadways only, and not interstates, US highways, state highways, or local streets. While the county will continue to cooperate and collaborate with other jurisdictions to improve safety, this analysis specifically addressed safety on the county roadway network.



Legend

- Fatal Crash Location
- Serious Injury Crash Location (Type A Injury Crashes)
- Interstates
- US Highways
- State Highways
- County State Aid Highways (CSAH)
- County Roads
- Local Roads

N

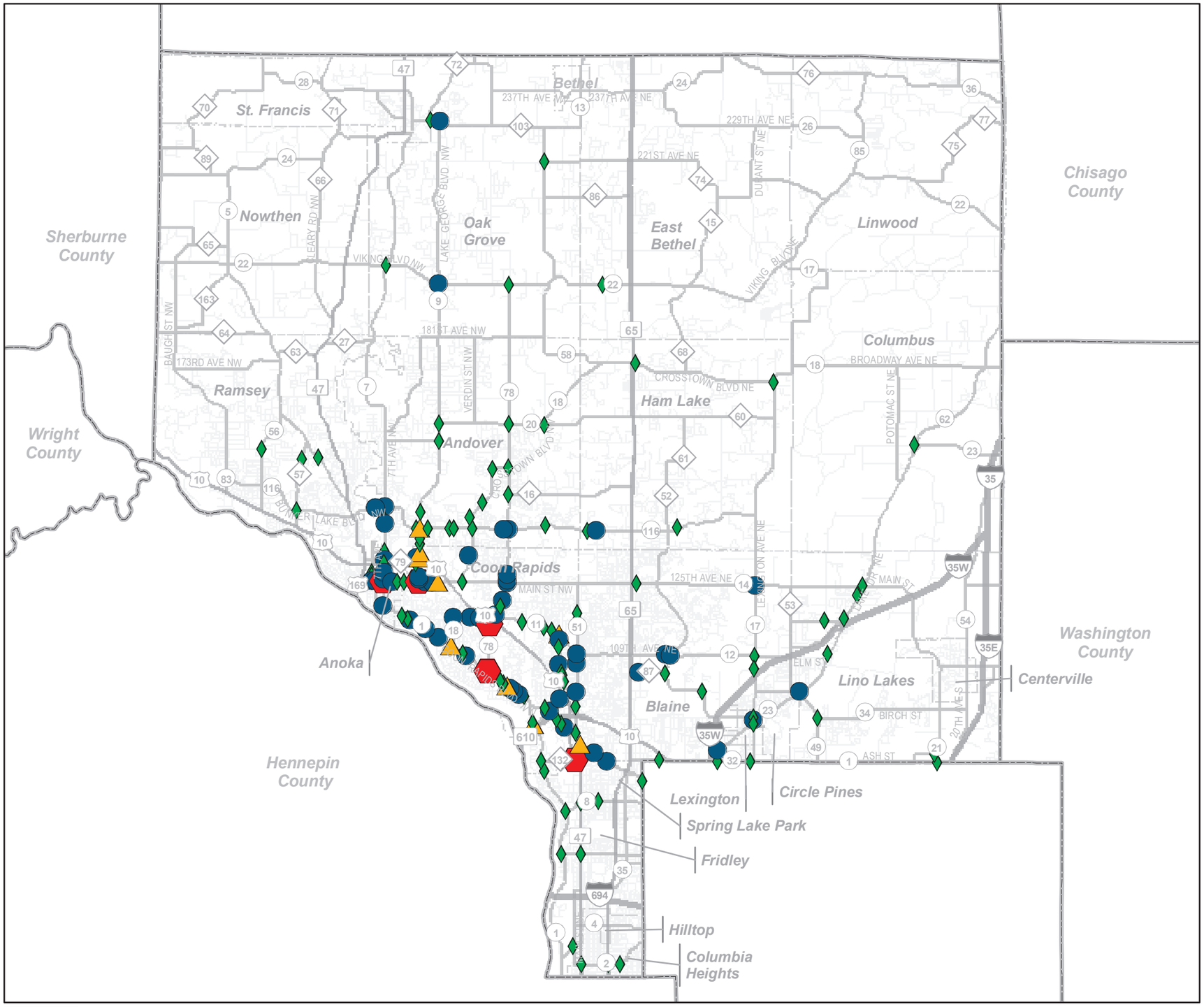
0 1.5 3 6 Miles

1 inch = 3 miles

Source: Minnesota Department of Public Safety's Crash Records (2002-2006).

Figure 4-3

Fatal and Serious Injury Crash Locations, 2002-2006



Legend

High Incident Crash Locations

- 10 - 20 Crashes
- 21 - 50 Crashes
- 51 - 70 Crashes
- 71 - 114 Crashes

- Interstates
- US Highways
- State Highways
- County State Aid Highways (CSAH)
- County Roads
- Local Roads

N

0 1.5 3 6 Miles

1 inch = 3 miles

Source: Minnesota Department of Public Safety's Crash Records (2002-2006).

Figure 4-4

High Incident Crash Locations, 2002-2006

4.7 Critical Emphasis Areas (CEAs)

The demand for resources to address traffic safety needs far exceeds available safety funding levels. As a result, the county identified the most critical safety needs to decrease traffic fatalities, organizing them under Critical Emphasis Areas (CEAs).

4.7.1 Review of County Crash Data

The initial step in the prioritization process involved identifying the number of fatalities on Anoka County highways associated with each of the 22 safety emphasis areas described in AASHTO's SHSP. The results of this effort are summarized in Table 4-2.

TABLE 4-2
Anoka County Traffic Fatalities by AASHTO's 22 Emphasis Areas (from the Strategic Highway Safety Plan)

Part	Emphasis Area	Fatalities on Anoka County Highways *(Based on crash records for Years 2002 – 2006)*	Percent
Part 1: Drivers	1. Instituting Graduated Licensing for Young Drivers	17 fatalities involving drivers under age 21	35%
	2. Ensuring Drivers are Licensed and Fully Competent	0 fatalities involved a driver with an invalid license *(Information regarding driver license status was added to the crash record database in 2003)*	0%
	3. Sustaining Proficiency in Older Drivers	6 fatalities involved a driver over 64	12%
	4. Curbing Aggressive Driving	13 fatalities involved a speeding driver	27%
	5. Reducing Impaired Driving	13 fatalities were alcohol related	29%
	6. Keeping Drivers Alert	3 fatalities involved an inattentive/sleepy driver	6%
	7. Increasing Driver Safety Awareness	-- Not Quantifiable --	
	8. Increasing Seat Belt Usage	12 out of the 34 vehicle occupant fatalities were not using a restraint device	38%
Part 2: Special Users	9. Improving Pedestrian and Bicycle Safety- Making Walking and Street Crossing Safe	8 pedestrian fatalities	16%
	10. Improving Pedestrian and Bicycle Safety- Ensuring Safety Bicycle Travel	1 bicyclists fatalities	2%
Part 3: Vehicles	11. Improving Motorcycle Safety and Increasing Motorcycle Awareness	5 motorcyclists fatalities	10%
	12. Making Truck Travel Safer	3 fatalities involving heavy vehicles	6%
	13. Increasing Safety Enhancements in Vehicles	-- Not Quantifiable –	

TABLE 4-2
Anoka County Traffic Fatalities by AASHTO's 22 Emphasis Areas (from the Strategic Highway Safety Plan)

Part	Emphasis Area	Fatalities on Anoka County Highways *(Based on crash records for Years 2002 – 2006)*	Percent
Part 4: Highways	14. Reducing Vehicle-Train Crashes	0 fatalities involving a collision with a train	0%
	15. Reducing Lane Departure Crashes - Keeping Vehicles on the Roadway	7 single vehicle run-off the road fatalities	14%
	16. Reducing Lane Departure Crashes - Minimizing the Consequences of Leaving the Road	Top 3 most harmful events for the 18 SVROR fatalities were: Collision with a utility pole (4) Overturn/Rollover (3) Collision with a tree/shrubbery (3)	37%
	17. Improving the Design and Operation of Highway Intersections	19 fatalities at an intersection	39%
	18. Reducing Head-On and Across Median Crashes	11 head-on and across-median fatalities	22%
	19. Designing Safer Work Zones	0 work zone fatalities	0%
Part 5: Emergency Medical Services	20. Enhancing Emergency Medical Capabilities to Increase Survivability	In 2005, the average response time (time of crash to arrival hospital) was 52.0 minutes for 4 rural fatal crashes (time exceeded 1 hour in 1 crash). For 34 urban fatal crashes, the average response time was 27.9 minutes (time exceeded 1 hour in none of the crashes) based on the FARS database.	
Part 6: Management	21. Improving Information and Decision Support Systems	-- Not Quantifiable --	
	22. Creating More Effective Processes and Safety Management Systems	-- Not Quantifiable --	

NOTE: Between 2002 and 2006, there were 45 fatal crashes that resulted in 49 fatalities on the Anoka County Highway System.

4.7.2 Critical Emphasis Area Rankings

CEAs applicable to county crashes were ranked by the number of fatalities. The top safety emphasis areas are documented in Table 4-3, along with the number and percentage of fatalities in the county. A breakdown of traffic fatalities in each CEA by Anoka County by roadway jurisdiction (e.g., county, State, or City) is provided in Appendix C.

Nine of the CEAs adopted by the county match the state's CEAs, as documented in the Minnesota SHSP. Two CEAs not identified in the Minnesota SHSP were added to Anoka County's: Keeping Drivers Alert, and Reducing Motorcycle Crashes. The addition of these CEAs reinforces the county-specific, data-driven process, allowing the selection of appropriate and effective strategies for addressing specific crash types.

TABLE 4-3
Anoka County Critical Emphasis Areas

Critical Emphasis Area	Related Anoka County Fatalities[1]	Percent of Anoka County Fatalities (49 b/w 2002-2006)[2]	Serious Injuries	Fatalities & Serious Injuries
1) Improving Design and Operation of Highway Intersections *(Ranked #3 in Mn SHSP)*	19	39%	181	200
2) Addressing Young Drivers' Over Involvement *(Ranked #6 in Mn SHSP)*	17	35%	97	114
3) Reducing Lane Departure Crashes (Head-On and Run-Off Road Crashes) *(Ranked #4 & 7 in Mn SHSP)*	18	37%	94	112
4) Keeping Drivers Alert *(Not Ranked in Mn SHSP)*	3	6%	91	94
5) Increasing Seat Belt Usage *(Ranked #1 in Mn SHSP)*	13	27%	65	78
6) Curbing Aggressive Driving *(Ranked #5 in Mn SHSP)*	13	27%	45	58
7) Reducing Impaired Driving *(Ranked #2 in Mn SHSP)*	14	29%	38	52
8) Reducing Motorcycle Crashes *(Not in Mn SHSP)*	5	10%	31	36
9) Improving Pedestrian and Bicycle Safety *(Not in Mn SHSP)*	9	18%	26	35
10) Utilizing Information and Decision Support Systems *(Not in Mn SHSP)*	—Not Quantifiable—			

1—Source: Minnesota Crash Records Database (2002–2006) for Anoka County's County State Aid Highways and County Highways.

2—Percentage based on vehicle occupant fatalities instead of all traffic fatalities.

4.7.3 Infrastructure vs. Driver- Behavior-Based Critical Emphasis Areas

Strategies to reduce crashes depend on whether a CEA is infrastructure-based or driver-behavior-based. Infrastructure-based emphasis areas refer to characteristics of the area in which crashes occur. Driver-behavior-based emphasis areas refer to motorist characteristics or actions that contribute to crashes. Anoka County's CEAs are categorized in Table 4-4 by infrastructure-based, driver-behavior-based, or other emphasis areas.

Because driver behavior is tied to laws made at the national or state level, the county generally has less ability to address driver-behavior-based CEAs. The county's most effective approach to addressing driver-behavior-based CEAs will be focused on public education, law enforcement, and cooperation and collaboration with other county departments, agencies, and schools. The county has more opportunity to address infrastructure-based CEAs, as many of the associated strategies can be implemented as separate roadway improvement projects, or along with other planned improvements.

TABLE 4-4
Anoka County Critical Emphasis Category—Driver-Behavior-Based or Infrastructure-Based

Driver-Behavior-Based Emphasis Areas	Infrastructure-Based Emphasis Areas	Other Emphasis Area
2) Addressing Young Drivers' Over Involvement	1) Improving Design and Operation of Highway Intersections	10) Utilizing Information and Decision Support Systems
4) Keeping Drivers Alert	3) Reducing Lane Departure Crashes (Head-on and Run-off Road Crashes)[1]	
5) Increasing Seat Belt Usage	9) Improving Pedestrian and Bicycle Safety	
6) Curbing Aggressive Driving		
7) Reducing Impaired Driving		
8) Reducing Motorcycle Crashes		

1—Because of the similar strategies used to address the CEAs *Reducing Head-On and Across-Median Crashes* and *Keeping Vehicles on the Roadway & Minimize the Consequences of Leaving the Road*, the strategies were combined into the CEA, "Reducing Lane Departure Crashes," for the purposes of this analysis.

4.8 Critical Safety Strategies

Within each adopted CEA, strategies most likely to address a majority of crashes were identified to effectively apply the limited safety resources available to reduce traffic fatalities on the county network. A screening process was used to identify the top critical strategies for the adopted CEAs. The county will first look to these strategies when addressing safety issues. The strategies do not replace or supersede existing programs; instead, they define direction for new investments. These strategies are outlined in detail in Appendix C, Anoka County Strategic Highway Safety Plan Technical Memorandum. Examples of adopted strategies include:

- Providing advance warning of unexpected horizontal curves and edgeline enhancements to assist drivers in maintaining their lanes for lane departure crashes , and
- Providing sidewalks/walkways, paved shoulders, bike paths, curb ramps, and raised medians where appropriate to reduce pedestrian and bicycle exposure to vehicular traffic.

The complete lists of critical strategies for all of the critical emphasis categories are included in Appendix C.