CHAPTER 11 - TRAFFIC SAFETY

Table of Contents

11-1.00 INTRODUCTION ...........................................................................................................11-2
  11-1.01 Purpose ......................................................................................................................11-2
  11-1.02 Chapter Organization ...............................................................................................11-2

11-2.00 LIST OF ACRONYMS ...............................................................................................11-3

11-3.00 TRAFFIC SAFETY PLANNING .................................................................................11-4
  11-3.01 Toward Zero Deaths (TZD) ......................................................................................11-4
  11-3.02 Strategic Highway Safety Plan (SHSP) .................................................................11-4
  11-3.03 Regional and Local Planning ...................................................................................11-4
  11-3.04 Safe System Approach ............................................................................................11-5

11-4.00 CRASH REPORTING .................................................................................................11-5
  11-4.01 Statutes .....................................................................................................................11-5
  11-4.02 Crash Report Processing ........................................................................................11-6

11-5.00 CRASH DATA ..........................................................................................................11-7
  11-5.01 Data Practices ..........................................................................................................11-7
  11-5.02 Data Sources ...........................................................................................................11-8
  11-5.03 Data Requests .........................................................................................................11-9

11-6.00 SAFETY ANALYSIS .................................................................................................11-10
  11-6.01 Network Screening .................................................................................................11-10
  11-6.02 Other Analytical Considerations ..........................................................................11-15
  11-6.03 Project Selection ....................................................................................................11-18
  11-6.04 Project Evaluation ..................................................................................................11-20

11-7.00 FUNDING AND PROJECT ELIGIBILITY ...............................................................11-21
  11-7.01 Highway Safety Improvement Program (HSIP) ....................................................11-21
  11-7.02 Safety Set-Aside Funds .........................................................................................11-22

List of Figures
  Figure 11-1 Data Ties to Incident ID ..................................................................................11-6
  Figure 11.2 Crash Path Data ..............................................................................................11-7
  Figure 11.3 Site Screening Example ...................................................................................11-12
  Figure 11.4 Typical Collision Intersection Diagram ......................................................11-16
11-1.00 INTRODUCTION

11-1.01 Purpose

Safety is a core value embraced by the Minnesota Department of Transportation and included in the agency’s mission statement. The traffic engineer’s role in safety is to prevent or mitigate crashes involving motor vehicles and other roadway users. Addressing crashes involving the loss of life or serious injury is the top priority in terms of traffic safety - and is supported by the Highway Safety Improvement Program’s (HSIP) objective of reducing fatal and life altering crashes. There is a need to proactively identify fatal and serious injury crash risks systemwide. The general approach and principles are the following:

- Death and serious injuries are unacceptable – efforts to reduce fatal and serious injury crashes are prioritized.
- Understand that people make mistakes – the system can and should be designed and operated to allow for known and common human mistakes.
- People are fragile – people have limits for tolerating crash forces, so system design (vehicles and roadways) should accommodate this human fragility.
- Safe mobility is provided for vulnerable road users (pedestrians, bicyclists, motorcyclists, etc.).
- Redundancy needs to be considered – if one part of the system fails, other elements provide protection.
- Safety is proactive and systematic – proactive risk assessment should be done to identify and mitigate systematic risks instead of waiting for crashes to occur.
- Responsibility is shared between all stakeholders (road owners, road designers, enforcement, education, emergency services, vehicle manufacturers, road users, etc.).
- While maximum safety would be an ideal in an unconstrained world, the balancing of many systemic needs can create difficult choices. Road owners should work to optimize system-wide safety based on the known resource constraints given.

Traffic safety includes many of the products and services MnDOT provides to the traveling public. Items such as winter maintenance operations, well maintained roadways with pavement markings, and roads designed to integrate the needs of all users while economically and efficiently moving people and goods are all part of providing a safe transportation network.

Opportunities to make general improvements that reduce the potential for all crashes should be pursued in conjunction with other programs and funding opportunities.

11-1.02 Chapter Organization

This chapter is organized around improving traffic safety on Minnesota roads. Each section contains a list of resources the traffic engineer may find useful.

- Section 2 is a list of acronyms.
- Section 3 discusses the importance of strategic planning to create a coordinated, systematic approach to safety in a region.
- Section 4 describes the crash reporting process from an incident through officer reporting to a centralized database.
- Section 5 describes crash data regarding data practices, data sources, and data requests.
- Section 6 walks through the resources and techniques in the safety project process, from network screening and analysis to project selection to evaluation.
- Section 7 outlines the Highway Safety Improvement Program (HSIP) and other funding options.
## LIST OF ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>4Es</td>
<td>Major focus areas to reduce traffic injuries and fatalities:</td>
</tr>
<tr>
<td></td>
<td>1. Education,</td>
</tr>
<tr>
<td></td>
<td>2. Enforcement,</td>
</tr>
<tr>
<td></td>
<td>3. Engineering,</td>
</tr>
<tr>
<td></td>
<td>4. Emergency Medical &amp; Trauma Services</td>
</tr>
<tr>
<td>A</td>
<td>Injury Suspected serious injury</td>
</tr>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
</tr>
<tr>
<td>ADT</td>
<td>Average Daily Traffic</td>
</tr>
<tr>
<td>BCA</td>
<td>Bureau of Criminal Apprehension</td>
</tr>
<tr>
<td>CMF</td>
<td>Crash Modification Factor</td>
</tr>
<tr>
<td>CR</td>
<td>Total Crash Rate</td>
</tr>
<tr>
<td>CRF</td>
<td>Crash Reduction Factor</td>
</tr>
<tr>
<td>DOT</td>
<td>Department of Transportation</td>
</tr>
<tr>
<td>DPS</td>
<td>Minnesota Department of Public Safety</td>
</tr>
<tr>
<td>DVS</td>
<td>Minnesota Department of Public Safety, Driver Vehicle Services Division</td>
</tr>
<tr>
<td>FAR</td>
<td>Fatal (K) and incapacitating injury (A) crash rate</td>
</tr>
<tr>
<td>FHWA</td>
<td>Federal Highway Administration</td>
</tr>
<tr>
<td>HSM</td>
<td>AASHTO Highway Safety Manual</td>
</tr>
<tr>
<td>HSIP</td>
<td>Highway Safety Improvement Program</td>
</tr>
<tr>
<td>LRRB</td>
<td>Minnesota Local Road Research Board</td>
</tr>
<tr>
<td>LTAP</td>
<td>Minnesota Local Technical Assistance Program</td>
</tr>
<tr>
<td>MnCMAT2</td>
<td>Minnesota Crash Mapping Analysis Tool</td>
</tr>
<tr>
<td>NCHRP</td>
<td>National Cooperative Highway Research Program</td>
</tr>
<tr>
<td>OTE</td>
<td>Office of Traffic Engineering</td>
</tr>
<tr>
<td>PAR</td>
<td>Police Accident Report</td>
</tr>
<tr>
<td>PII</td>
<td>Personally Identifiable Information</td>
</tr>
<tr>
<td>RSA</td>
<td>Road Safety Audit</td>
</tr>
<tr>
<td>SALT</td>
<td>State Aid for Local Transportation</td>
</tr>
<tr>
<td>SHSP</td>
<td>Strategic Highway Safety Plan</td>
</tr>
<tr>
<td>TRB</td>
<td>Transportation Research Board</td>
</tr>
<tr>
<td>TZD</td>
<td>Toward Zero Deaths</td>
</tr>
<tr>
<td>VMT</td>
<td>Vehicle Miles Traveled</td>
</tr>
</tbody>
</table>
11-3.00 TRAFFIC SAFETY PLANNING

11-3.01 Toward Zero Deaths (TZD)

In pursuing the goals of the HSIP, MnDOT employs the Toward Zero Deaths (TZD) approach based on the belief that even one traffic-related death on Minnesota roads is unacceptable. The idea was first adopted in Sweden in 1997 as “Vision Zero”. Since then, several state DOTs, including Minnesota, have identified zero deaths as a core objective in their Strategic Highway Safety Plans. TZD was also adopted as a national strategy in 2009.

Minnesota TZD is the cornerstone of the state’s traffic safety program, employing an interdisciplinary approach to reducing traffic crashes, injuries, and deaths on Minnesota roads. TZD uses a data-driven approach that targets areas for improvement and employs proven countermeasures that integrate education, enforcement, engineering, and emergency medical & trauma services (the “4Es”).

While individual disciplines have a long history of successful traffic safety programs, TZD aims to tie these together with a common vision and mission for even greater success. A combination of strategies from different focus areas is often most effective for solving a particular problem. Often the tendency is to jump to only roadway deficiencies or only driver behavior as potential focus areas to improving roadway safety. Whenever possible, a 4E approach should be the first step in assessing how to improve roadway safety.

The TZD program uses data to target areas for improvement and employ proven countermeasures. Each district has staff assigned to support and promote TZD. These resources should be used to the maximum extent possible when working on safety related items.

The TZD team works in partnership with community and corridor groups to improve the traffic safety of a designated area. Toward Zero Deaths provides technical assistance, materials, and guidance to local groups that are committed to reducing crashes and the fatalities and incapacitating injuries that result from them – both at an infrastructure programming level as well as a community engagement level.

11-3.02 Strategic Highway Safety Plan (SHSP)

The Minnesota Strategic Highway Safety Plan (SHSP) is a policy plan that sets an overall direction for future safety strategies and presents a framework for selecting strategies. The plan provides insight and direction on how to reduce traffic-related crashes on all Minnesota roads. It describes how many, where, what type, and to whom motor vehicle crashes occur. The plan prioritizes key focus areas and strategies and wherever possible, highlights opportunities for collaboration.

The SHSP is a policy plan based on data and trends that affect traffic safety. It was developed in consultation with safety stakeholders from across the 4Es and other disciplines.

The SHSP is tightly integrated with the goals and objectives of the TZD program. Like the TZD program, the SHSP takes a holistic 4Es approach to traffic safety. Performance measures are outlined to chart progress toward a goal of zero deaths on Minnesota roads. By providing benchmarks and measures, decisions can be made to support the various statewide, district, and local projects or programs.

The development of the SHSP is a requirement of the Federal Highway Administration. The plan is intended to be updated every five years. As a living document, it reflects the priorities and practices of the Department, especially for how it intends to operate in coordination with the Highway Safety Improvement Program (HSIP). This resource provides a vast array of data and relationships that can be of assistance when approaching a traffic safety topic.

11-3.03 Regional and Local Planning

Regional and local organizations are encouraged to incorporate safety into their long-term planning. The plans should take into account statewide initiatives through the TZD program or SHSP as well as local crash trends and stakeholder input.
Preparing roadway safety plans should answer three fundamental questions that are essential to developing safety projects for the HSIP:

1. **What are the priority crash types?**
   Analyze data to identify specific safety focus areas, i.e. crash types that represent the greatest opportunity for reduction. To qualify for HSIP funding, the priority crash types must in some way relate to fatal and serious injury crashes.

2. **What are the priority safety strategies?**
   Identify a comprehensive list of effective safety strategies to address the focus areas. Convene a workshop to identify a short list of implementation strategies at specific high-priority locations.

3. **What are the priority locations where projects should be implemented?**
   Conduct a system-wide risk assessment to identify the high-priority candidate locations for safety investment. When selecting locations for an improvement project, multiple criteria will be considered, including risk, crash history, mitigation costs, the ability to incorporate an improvement in an upcoming road project, local partner support, and benefit/cost ratios.

The need for safety planning is based on the fact that over 90 percent of severe crashes occur at locations not considered high-crash locations, and typically with no severe crash history. MnDOT OTE staff have extensive experience developing road safety plans and systemic risk assessment, including District and County Road Safety Plans. For more information or assistance in developing a safety plan, contact OTE.

11-3.04 **Safe System Approach**

In alignment with the goals of TZD, the Safe System approach is focused on reducing the severity of crashes. With a variety of causation factors for crashes, it is unrealistic to think we will be able to eliminate all crashes. In a Safe System, it is recognized that crashes will continue to occur, so the focus is on mitigating the impacts on humans in those crashes.

The Safe System approach has been successfully used in several other countries but is relatively new to the United States. MnDOT is currently determining what the Safe System approach looks like in Minnesota.

11-4.00 **CRASH REPORTING**

11-4.01 **Statutes**

Minnesota Statutes, Section 169.09, Subdivision 7 ([Minn. Stat. Sec 169.09, Subd. 7](#)) states that the driver shall forward a written report of an accident to the commissioner of public safety within 10 days if involved in a crash resulting in bodily injury to or death of any individual, or total property damage to an apparent extent of $1,000 or more.

Minnesota Statutes, Section 169.09, Subdivision 8 ([Minn. Stat. Sec 169.09, Subd. 8](#)) states that a peace officer who investigates an accident shall forward an electronic or written report of the accident as prescribed by the commissioner of public safety within 10 days of an accident.

MnDOT should encourage and promote all law enforcement agencies to complete and submit crash reports that meet the legal definition of a motor vehicle crash to the Department of Public Safety (DPS). State departments and local government units can only do analysis on what is known and reported to DPS.
11-4.02 Crash Report Processing

11-4.02.01 MNCrash

Prior to 2016, a Police Accident Report (PAR) form was used by all law enforcement agencies when reporting a crash to DPS. These reports were submitted either electronically or in a paper copy. Paper copies were scanned and manually entered into the state crash database by DPS staff. Prior to 2003, all PARs were submitted in paper copies which had to be scanned and manually entered into the database. Reports completed by citizens were also entered into the database prior to 2016.

Since January 1, 2016, officer reports are completed and uploaded electronically to the MNCrash system. The MNCrash system was built and is operated by DPS, and the new format allows officers to complete and submit crash reports in a more timely and accurate manner. The MNCrash system also has helped to improve the overall quality and consistency in crash reporting by incorporating an organized sequence of steps for officers to walk through each time they fill out a new report.

11-4.02.02 Encoding Crash Reports

All reports received by DPS are assigned a unique Incident ID number. Individual crashes are coded and geographically located unless the location is unknown. Many elements from the crash report are tied to the individual crash record including details about the location, the time of the crash, weather and road conditions, traffic control, the type of crash, and more. Figure 11.1 shows the core data associated with the Incident ID.

![Figure 11.1 Data Ties to Incident ID](image)

11-4.02.03 National Definitions

11-5.00 CRASH DATA

11-5.01 Data Practices

11-5.01.01 Appropriate Use

The Driver and Vehicle Services Division (DVS) at DPS collects and maintains all motor vehicle crash reports for the State of Minnesota in the MNCrash system. Crash reports contain non-public data and are to be used for crash analysis purposes. Caution must be exercised to maintain the confidential status of individual reports as provided in Minn. Stat. 169.09, Subd. 13.

Full crash reports are available directly from DVS for individuals involved in the crash or their authorized representative. No private or confidential data collected, maintained, or used shall be disseminated except as provided in Minn. Stat. 169.09, Subd. 13.

Crash data is provided by DPS for use by MnDOT in two ways. One copy of the data contains necessary Personally Identifiable Information (PII) for damage restitution and the other copy with PII removed for traffic safety engineering. PII includes any information that can specifically identify individuals or vehicles involved in the crash, including names, driver’s license numbers, and vehicle plate numbers.

The crash data that has been scrubbed of PII is fed back into the MNCrash system where MnDOT can gain access to it. MnDOT personnel in the OTE Safety section utilize this non-PII data to conduct crash analyses. This data is shared with MnDOT traffic staff, as well as City and County engineering staff. Crash data may not be shared with anyone who is not performing crash analysis for traffic safety engineering purposes. The user must complete an agreement acknowledging the restricted use of this crash data. Figure 11.2 shows the path of crash data in Minnesota.
11-5.01.02 Retention and Security

Electronic and/or paper copies of motor vehicle crash reports may be kept on a temporary basis while needed for crash analysis. Electronic files must be stored on a secure MnDOT networked computer accessible by employee active directory (AD) accounts only, i.e. on the user’s personal network drive.

Paper copies of motor vehicle crash reports must be secured in a locked cabinet or locked room, so they are not accessible to employees or others who are not using them for crash analysis.

It is recommended that private data be redacted from any printed crash report whenever feasible. Crash reports are to be securely disposed of by shredding when they are no longer needed for crash analysis.

11-5.01.03 Citation of Sources

A suite of tools has been developed to work with crash data. Each tool has its own strengths and weaknesses depending on the needs of the analysis. As data become more integrated, a time stamp becomes necessary to record when, during the continuous loading cycle of the data, the export of particular crash data was completed.

To ensure that results can be replicated, always record (1) the data source and (2) date of export. A note of any filters that have been applied may be useful if the analysis needs to be repeated.

11-5.01.04 Editing Crash Data

MnDOT OTE Safety staff use multiple tools to ensure crash data and the ever-changing roadway network are continually aligned with one another. This includes the editing of statewide interchange, intersection, and section files. These files are used to create the Traffic Crash Toolkit and other statewide analyses of trunk highways.

Crash data that have been located by DPS and any changes made over time are imported every hour from DPS. All changes made by DPS or OTE Safety staff will affect downstream systems, e.g. databases, dashboards, etc. MnDOT has the capability to correct location errors as part of the ESRI Event Editor, which allows users to alter the LRS-compatible Route ID and Measure. Access to this tool is available only to users that have the appropriate training.

11-5.02 Data Sources

11-5.02.01 Motor Vehicle Crash Reports

Individual crash reports are no longer used to conduct crash analyses. Crash data that has been scrubbed of PII from DPS is automatically sent to a MnDOT database system every hour. This data includes all the necessary information to conduct crash analyses. Before 2016, authorized MnDOT employees could access motor vehicle crash reports via secure login to a DVS server.

It is noted that crash data that includes all PII is sent from DPS to the MnDOT Damage Restitution group. Those specific crash records are only available to those specialists who are assigned the specific task of reviewing and submitting insurance claims, and the data is not available to anyone outside of that group.

Citizen completed crash reports are no longer used in crash analyses and are not included in the data that MnDOT receives from DPS.

11-5.02.02 CrashMART

CrashMART is a mapping tool that allows users to view, filter, and download crash data for the past 10 calendar years plus the current year. Crash data in this tool is updated daily. CrashMART is only available to approved MnDOT staff.
11-5.02.03 Minnesota Crash Mapping Analysis Tool (MnCMAT2)

MnCMAT2 is a mapping tool updated quarterly through the MnDOT State Aid office. Spatial selection and filters provide both high-level trends and detailed drill-down. Exports include crash data, maps, charts, and reports. At this time, the application provides many but not all data fields for filtering; those crashes with a valid location are mapped to the roadway network. For access, request approval from a MnDOT Traffic Engineer, a County Engineer, or City Engineer and complete an online form available on the MnCMAT2 webpage.

11-5.02.04 Oracle BI

Oracle BI is a tool that allows all MnDOT users to query, analyze, and trend crash data with interactive dashboards, reports, and analyses. This tool is especially useful in monitoring safety metrics and ad hoc analyses. Currently accessible to all MnDOT staff, contact OTE for access.

11-5.02.05 MnDOT Traffic Safety Fundamentals Handbook

The MnDOT Traffic Safety Fundamentals Handbook is a resource that can be used as a reference for many aspects of both understanding factors that go into crashes as well as ways to address traffic safety. This handbook goes into the details of crash characteristics, the safety improvement process, and safety strategies.

11-5.02.06 Minnesota Motor Vehicle Crash Facts

Researchers at the Office of Traffic Safety (OTS) at DPS annually produce the Minnesota Motor Vehicle Crash Facts. This detailed report summarizes a variety of information related to crashes: who, what, where, when, and why. In addition, the report breaks out information regarding the following: alcohol, seat belt use, motorcycles, trucks, pedestrians, bicycles, school buses, and trains.

The reports contain a discussion of crash trends as well as graphical and tabular displays of crash data. The purpose is to provide detailed summary information about motor vehicle crashes primarily at a statewide level.

11-5.02.07 Fatality Analysis Reporting System (FARS)

FARS is a national dataset maintained by National Highway Traffic Safety Administration (NHTSA) of fatal traffic crashes. The database contains 143 different elements to characterize a crash; certain fields are available in FARS data that are too resource intensive to maintain for all crash severities. No personal identifying information is recorded. All FARS data is publicly available. Due to the time needed to gather this nationwide dataset, the most current FARS data is typically two years old.

11-5.02.08 Crash Reconstruction Reports

The Minnesota State Patrol investigates a number of serious and fatal motor vehicle crashes to document how the crashes occurred and determine what factors may have contributed to the crash. These detailed reports can be requested from the Minnesota State Patrol, though a business reason is needed for them and availability is determined on a case by case basis.

11-5.03 Data Requests

Requests for crash information are often received by both MnDOT staff and many of our transportation and traffic safety partners. Data requested can vary greatly in size and scope, from statewide reports detailing annual crash trends to site-specific crash data.

Any request for information concerning a specific location on the trunk highway system, regardless of the source, should be directed to the appropriate MnDOT District Traffic Engineer. Project managers and consultants working on MnDOT projects should also obtain crash data through their District Traffic Office contact. General requests for statewide or system wide data should be referred to the OTE Safety section.
Any request concerning information relating to the local system, regardless of the source, should be directed to the local road authority for processing. This guarantees the local government agency will have full knowledge of all information being provided to the requester. District, State Aid, or OTE assistance may be provided if requested.

Regardless of system, a Data Practices Request Form must be completed for all requests originating from legal professionals. This form and other related information can be found on the MnDOT Data Practices Information webpage.

11-6.00 SAFETY ANALYSIS

11-6.01 Network Screening

11-6.01.01 Traffic Crash Toolkit

Identification of hazardous locations is essential to the allocation of resources and to improving safety on our roads. The Office of Traffic Engineering (OTE) provides screening Toolkits for intersections and segments of trunk highways.

The Toolkit spreadsheets detail crash history and roadway characteristics for each site. Sites in the sections Toolkit include over 11,000 miles of trunk highways, and sites in the intersection Toolkit include over 19,000 intersections on trunk highways. These large numbers of sections and intersections are grouped by characteristics of each allowing the user to compare crash results on their section or intersection to a large dataset of comparable locations.

Copious amounts of data are available through the Toolkits including crash frequency, injury severity, crash rates, and traffic volumes. The Toolkits are intended to be objective network screening tools that facilitate the identification of locations for further investigation. There are a variety of methods supported by the Toolkits, each with their relative strengths and weaknesses. The most typical uses of the Toolkits are highlighted below. Additional support in using the Toolkit is available by contacting OTE. Due to changes in crash data reporting beginning in 2016 as well as continuous improvement in crash data locating, the most recent versions of the Toolkits should always be used.

11-6.01.02 Ranking

With limited funds, safety improvements can only be implemented at a certain number of locations per year. To identify where those funds should be directed, locations need to be ranked. The fatal (K) and suspected serious injury (A) crash rate (FAR) index is a key metric in identifying locations where strategies can be implemented to move Toward Zero Deaths.

A number of other criteria can be considered when ranking locations. Those include overall crash rates, crash densities, crash costs, and risk rankings and other surrogate safety characteristics.

For locations that are highly ranked, a site analysis should be done to ensure an understanding of the issue, or even to identify if there is not an issue at this location. Any solutions should be tailored to the site and its specific issues.

Caution should be exercised if only crash costs are used as the basis for ranking locations. Using just one metric like this can lead to skewing. The large number of property damage crashes that occur at high volume signalized intersections can be overrepresented by crash costs even when there are few to no fatal or injury crashes. It is recommended that multiple metrics be considered when identifying locations for improvements.
11-6.01.03 Crash Rate

Published research on transportation and traffic safety has demonstrated there is a positive correlation between crash frequency on a roadway and the traffic volume on that roadway. Calculating crash rates is one method of measuring the number of crashes while controlling for this traffic exposure. For intersections, exposure is defined as entering vehicles; for segments, exposure is defined as vehicle miles traveled (VMT).

\[
\text{Intersection Crash Rate} = \frac{\text{Crashes}}{\text{Days} \times \text{Entering Volume}} \times 1,000,000
\]

\[
\text{Entering Volume} = \frac{1}{2} \times (ADT_{leg1} + ADT_{leg2} + ...)
\]

\[
\text{Segment Crash Rate} = \frac{\text{Crashes}}{\text{VMT}} \times 1,000,000
\]

\[
\text{VMT} = \text{Days} \times \text{ADT} \times \text{Length}
\]

The total crash rate (CR) is defined as the number of crashes per million vehicle miles traveled for segments or per million entering vehicles for intersections. FAR is defined as the number of fatal and suspected serious injury crashes per 100 million vehicle miles traveled for segments or per million entering vehicles for intersections.

Crash rates are benchmarked against other similar locations. However, a location that has a crash rate exceeding the average crash rate for similar locations should not be interpreted as having a safety issue. Instead, other measures that accommodate the fluctuation in crashes should be used to assess the relative safety of a location.

11-6.01.04 Critical Crash Rate

Critical crash rates provide a statistical threshold for screening sites. The critical rate is calculated by weighting the average crash rate for similar intersections or segments across Minnesota by the existing traffic volume. The critical CR is calculated at a 99.5% confidence interval \((K = 2.576)\); the critical FAR is calculated at a 90.0% confidence interval \((K = 1.282)\).

\[
\text{Critical Crash Rate} = \text{Statewide Crash Rate} + K \times \sqrt{\frac{\text{Statewide Crash Rate}}{\text{Intersection or Segment Exposure}}} + 0.5 \times \frac{\text{Statewide Crash Rate}}{\text{Intersection or Segment Exposure}}
\]

\[
\text{Intersection Exposure} = \frac{\text{Days} \times \text{Entering Volume}}{1,000,000}
\]

\[
\text{Segment Exposure} = \frac{\text{VMT}}{1,000,000}
\]

The example shown below in Figure 11.3 illustrates critical rate screening. In this example, each of the 10 sites are of the same facility type (e.g. roundabouts, all-way stops, rural expressways, etc.) which is why the Minnesota statewide crash rate is consistent between them. The critical crash rate at each location varies based on the volume at each site. In this example, five of the sites have crash rates above the statewide rate, but only Site 8 has a crash rate above the critical crash rate. These results suggest that only Site 8 has a crash rate that is above the expected, normal range for this type of location in Minnesota.
11-6.01.05 Critical Index

A critical index is reported as the ratio of the observed crash rate to the critical crash rate. A critical index exceeding 1.00 indicates there may be a safety concern at the site. When analyzing the critical index, a value at or below 1.00 implies that the site does not deviate significantly from statewide trends, i.e. it is performing within expectations. As shown in Figure 11.3, though several sites have crash rates above the state average, Site 8 is the only location with a critical index of greater than 1.00.

The critical index should be treated as a binary result; either it is above 1.00 indicating a statistically significant safety issue at a site or it is at or below 1.00 indicating there is not a statistically significant safety issue at the site. When comparing multiple similar sites, the critical index could be used to prioritize sites. However, the critical index should not be treated as an order of magnitude ranking of site safety due to the site-specific nature of critical crash rates. For example, a site with a critical crash rate of 2.20 does not necessarily have twice as many safety issues as a site with a critical crash rate of 1.10.

\[
\text{CR Index} = \frac{\text{Total Crash Rate (CR)}}{\text{Critical CR}}
\]

\[
\text{FAR Index} = \frac{\text{Severe Crash Rate (FAR)}}{\text{Critical FAR}}
\]

To facilitate network screening, the Toolkit contains the critical index for filtering of problem locations. The CR Index is the total crash rate (CR) divided by the critical crash rate for total crashes. Similarly, the FAR Index is the fatal and A injury crash rate (FAR) divided by the critical crash rate for fatal and A injury crashes. These two measures are best suited to quantify the safety of an intersection or a segment of road.

Locations that have a high FAR index are good candidate locations for investments from HSIP; locations with a high CR index should be considered for improvements as funding opportunities become available. Below are examples showing how crash rates and critical crash rates are calculated for an intersection and a segment.
Intersection:

The intersection of Trunk Highway (TH) X and Z Street had the following crashes over the last five years:

- 0 Fatal (K) Crashes
- 1 Suspected Serious Injury (A) crash
- 1 Suspected Minor Injury (B) crashes
- 1 Possible Injury (C) crashes
- 4 Property Damage Only (N) crashes

The ADT on TH X is 15,000 vehicles while the ADT on Z Street is 3,000 vehicles. With this being a four-leg intersection, the entering volume is 18,000 vehicles per day. In the last five-year period there were 1,826 days. Using the equation from section 11-6.01.03, the total crash rate (CR) and severe crash rate (FAR) can be calculated.

\[
CR = \frac{7 \text{ crashes}}{1.826 \text{ days} \times 18,000 \text{ vehicles/day}} \times 1,000,000 = 0.213 \text{ crashes per million entering vehicles (MEV)}
\]

\[
FAR = \frac{1 \text{ crash}}{1.826 \text{ days} \times 18,000 \text{ vehicles/day}} \times 100,000,000 = 3.042 \text{ crashes/100 MEV}
\]

The Statewide crash rates can be found in the current version of the Toolkit. With this being a thru-stop intersection in a rural area, the Statewide are 0.065 crashes/MEV for total crashes and 0.349 crashes/100 MEV for severe crashes. Using the equations from section 11-6.01.04, the critical crash rates, both total (Critical CR) and severe (Critical FAR) can be calculated.

\[
\text{Intersection Exposure} = \frac{1.826 \text{ days} \times 18,000 \text{ vehicles/day}}{1,000,000} = 32.868 \text{ MEV} = 0.329 \text{ 100 MEV}
\]

\[
\text{Critical CR} = 0.065 \frac{\text{crashes}}{\text{MEV}} + 2.576 \times \left( \frac{0.065 \frac{\text{crashes}}{\text{MEV}}}{32.868 \text{ MEV}} + \frac{0.5}{32.868 \text{ MEV}} \right) = 0.195 \frac{\text{crashes}}{\text{MEV}}
\]

\[
\text{Critical FAR} = 0.349 \frac{\text{crashes}}{100 \text{ MEV}} + 1.282 \times \left( \frac{0.349 \frac{\text{crashes}}{100 \text{ MEV}}}{0.329 \text{ 100 MEV}} + \frac{0.5}{0.329 \text{ 100 MEV}} \right) = 3.189 \frac{\text{crashes}}{100 \text{ MEV}}
\]

The critical indices can then be found using the equations from section 11-6.01.05.

\[
\text{CR Index} = \frac{0.213 \frac{\text{crashes}}{\text{MEV}}}{0.195 \frac{\text{crashes}}{\text{MEV}}} = 1.092
\]

\[
\text{FAR Index} = \frac{3.042 \frac{\text{crashes}}{100 \text{ MEV}}}{3.189 \frac{\text{crashes}}{100 \text{ MEV}}} = 0.954
\]
Segment:

A 2.3-mile section of TH Y saw the following crashes over the last five years:
- 0 Fatal (K) Crashes
- 1 Suspected Serious Injury (A) crash
- 2 Suspected Minor Injury (B) crashes
- 3 Possible Injury (C) crashes
- 12 Property Damage Only (N) crashes

This section of TH Y has an ADT of 9,000 vehicles. Using the equation from section 11-6.01.03, the total crash rate (CR) and severe crash rate (FAR) can be calculated.

\[
CR = \frac{18 \text{ crashes}}{1.826 \text{ days} \times 9,000 \text{ vehicles/day} \times 2.3 \text{ miles}} \times 1,000,000 = 0.476 \text{ crashes per million vehicle miles (MVM)}
\]

\[
FAR = \frac{1 \text{ crash}}{1.826 \text{ days} \times 9,000 \text{ vehicles/day} \times 2.3 \text{ miles}} \times 100,000,000 = 2.646 \text{ crashes/100 MVM}
\]

The Statewide crash rates can be found in the current version of the Toolkit. With this being a rural two-lane segment in a rural area, the Statewide are 0.465 crashes/MVM for total crashes and 1.869 crashes/100 MVM for severe crashes. Using the equations from section 11-6.01.04, the critical crash rates, both total (Critical CR) and severe (Critical FAR) can be calculated.

\[
\text{Segment Exposure} = \frac{1.826 \text{ days} \times 9,000 \text{ vehicles/day} \times 2.3 \text{ miles}}{1,000,000} = 37.798 \text{ MVM} = 0.378 \text{ 100 MVM}
\]

\[
\text{Critical CR} = 0.465 \frac{\text{crashes}}{\text{MVM}} + 2.576 \times \sqrt{\frac{0.465 \frac{\text{crashes}}{\text{MVM}}}{37.798 \text{ MVM}} + \frac{0.5}{37.798 \text{ MVM}}} = 0.764 \frac{\text{crashes}}{\text{MVM}}
\]

\[
\text{Critical FAR} = 1.869 \frac{\text{crashes}}{100 \text{ MVM}} + 1.282 \times \sqrt{\frac{1.869 \frac{\text{crashes}}{100 \text{ MVM}}}{0.378 \text{ 100 MVM}} + \frac{0.5}{0.378 \text{ 100 MVM}}} = 6.042 \frac{\text{crashes}}{100 \text{ MVM}}
\]

The critical indices can then be found using the equations from section 11-6.01.05.

\[
\text{CR Index} = \frac{0.476 \frac{\text{crashes}}{\text{MVM}}}{0.764 \frac{\text{crashes}}{\text{MVM}}} = 0.623
\]

\[
\text{FAR Index} = \frac{2.646 \frac{\text{crashes}}{100 \text{ MVM}}}{6.042 \frac{\text{crashes}}{100 \text{ MVM}}} = 0.438
\]
11-6.01.06 Crash Costs

Crash costs are based on the value of a single life recommended by the US DOT and adjusted to include other related costs, e.g. loss of productivity, vehicle damage, etc. The standard values also account for all the injuries involved in a typical crash. For example, most fatal crashes in Minnesota involve more than one person, thus the crash value of a K crash is the average cost of all injuries per crash. The injury statistics are based on Minnesota recent (three year) crash data and are adjusted annually for inflation.

As mentioned previously, using only crash costs as the basis to conduct network screening is not recommended. However, crash costs are a vital component to assessing the magnitude of the safety improvement so that it is justified based on the crashes that are occurring. Ideally, the benefit (value of crashes reduced) is much more than the costs of the improvement over its expected life span. In some instances, other factors are incorporated into the benefit-cost calculations that go beyond safety such as travel-time savings, emissions, etc. Each program throughout the department considers what factors go into the benefit-cost calculations.

For purposes of the Highway Safety Improvement Program, the benefit-cost calculations should only quantify the savings from crash reductions. Due to the great discrepancy between the cost of a fatal crash versus a serious injury crash, a value of two times the A injury cost is substituted for a fatal crash for conducting benefit-cost calculations for HSIP. At the time of writing, the cost associated with a fatal crash is $12,800,000 while the cost associated with a serious injury crash is $720,000. Updated values can be obtained from the MnDOT Planning and Programming Group.

11-6.01.07 Other Screening Measures

Other data are available in the toolkit to do exploratory investigations including the ability to sort the data by the total number of crashes and crashes per mile. These measures can provide the basis to determine frequency of crashes, however no inference on the magnitude of the problem can be made due to the lack of a normalizing factor such as traffic volume.

11-6.02 Other Analytical Considerations

11-6.02.01 Selecting an Appropriate Time Period

In general, a five-year time period should be used when conducting network screening. Typically, traffic patterns and geometric conditions are stable within this window of time. Five years provides an adequate time period for patterns to emerge from the data while minimizing the potential for one year’s worth of crash history to skew the results.

The Minnesota Strategic Highway Safety Plan (SHSP) utilizes a five-year data period. If a five-year period is used in another large scale or statewide analysis, the SHSP analysis can be used as a benchmark.

Shorter or longer time periods can be considered on a case-by-case basis. For example, if significant development has occurred, or a drastic jump in traffic volume has occurred near the intersection in question, a three-year time period might be appropriate. Conversely, if the roadway environment has not changed for quite some time and the traffic volume has been relatively stable, a 10-year time period may be appropriate.
11-6.02.02 Intersection Collision Diagram

An intersection collision diagram is a tool used to graphically represent crashes at a specific intersection. Collision diagrams help identify crash patterns and may help identify potential problem areas. See Figure 11.4 for how a typical collision diagram may look. Collision diagrams are typically one page per intersection but can be more if there are many crashes that need to be included.

![Figure 11.4 Typical Collision Intersection Diagram](image)

Each recorded crash should be located near where the crash occurred in relation to the intersection. Include a summary of the number of crashes by severity for the entire intersection. Only data from crash reports should be diagrammed, do not include other sources.
Each located crash should summarize at least the following information:

1. Date of crash
2. Time of crash
3. Lighting conditions
4. Weather
5. Surface conditions
6. Crash severity
7. Manner of collision
8. Crash type
9. Relevant notes

11-6.02.03 Road Safety Audits

A Road Safety Audit (RSA) is the formal or informal traffic safety examination of an existing or future roadway by an independent, multidisciplinary team. It qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements. The emphasis usually focuses on reducing fatal and serious injury crashes. The State of Minnesota works with the FHWA, local jurisdictions, and Tribal governments to perform RSAs on existing roads and intersections and may also perform these functions during the project development process for new roads and intersections. RSAs are also encouraged during reconstruction, rehabilitation, and resurfacing projects.

Road Safety Audits should be performed while keeping crash trends (statewide (e.g. SHSP) and local) as well as traffic operations in mind. Often, individual segments and intersections may lack certain types of crashes or severities. However, in a broader context, the facility may be at just as high of a risk as those similar facilities with fatal and A injury and/or frequent crashes.

Road Safety Audits consist of three main components: Pre-Audit, Audit, and Post-Audit.

1. Pre-Audit
   This phase typically consists of gathering all the appropriate data. This may include crash history, traffic volumes, turning movement counts, vehicle classifications, peak hours and traffic flow characteristics, land use planning (past, present, and future), and bike/pedestrian usages. The pre-audit may include meeting with transportation officials, local citizens, politicians, and stakeholders to understand previous efforts and perceived issues.

2. Audit
   During the audit, an independent multidisciplinary team performs a field review of the particular location or stretch of roadway. All members of the team should have the pre-audit information on hand. Those leading the audit should be careful not to imply or direct certain strategies, but rather, let ideas occur “naturally” for discussion among the team. Segments and intersections should be discussed both as individual facilities and in the context of the entire corridor. Locations with frequent crashes should not be the only areas of focus. All discussions should be recorded by a designated person for later use in the development of the final report.

3. Post-Audit
   In this phase, everything is brought together and written into a final document. A presentation is provided to the stakeholders and owners of the road. The report includes recommendations ranging in costs, implementation time, and public acceptance.

For more information on road safety audits, see the RSA section on the OTE website, or the RSA section on the FHWA website.
11-6.03 Project Selection

11-6.03.01 Estimating the Safety Benefit of a Countermeasure

Once a location has been identified through a critical rate calculation or a systemic risk assessment, an appropriate countermeasure must be identified to help mitigate the root cause or characteristics of the crashes.

While no countermeasure can provide a 100 percent reduction in crashes, implemented countermeasures will change the frequency of a specific crash type. By matching specific countermeasures to the relevant crashes, an estimate for the safety benefit can be calculated. In general, estimated benefits can be obtained through CMFs or models. Crash prediction models and functions are powerful tools that incorporate a variety of countermeasures in their calculations.

11-6.03.02 Crash Modification Factor

One of the best tools for evaluating options for projects in regard to traffic safety is the use of Crash Modification Factors (CMF). The use of CMFs can be an easy tool to evaluate the overall effectiveness of a given strategy. However, other factors must still be considered, e.g. feasibility, cost, right-of-way impacts, local traffic conditions, public input, etc.

<table>
<thead>
<tr>
<th>CMF</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1.00</td>
<td>Expect number of crashes to be lower than current conditions.</td>
</tr>
<tr>
<td>1.00</td>
<td>Expect number of crashes to remain the same as current conditions.</td>
</tr>
<tr>
<td>&gt; 1.00</td>
<td>Expect number of crashes to be greater than the current conditions.</td>
</tr>
</tbody>
</table>

The lower the number is below 1.00, the greater the anticipated reduction in crashes. Conversely, the greater the number above 1.00, the greater increase in the number of anticipated crashes. A CMF of 2.00 would represent a doubling of the number of crashes.

Below is an example of how a CMF can aid in selecting an appropriate safety strategy:

An intersection has 12 crashes over three years. Two options are being considered: Option A with a CMF of 0.50, and Option B with a CMF of 1.50. Over the next three years, one would expect 2 crashes per year with Option A and 6 crashes per year with Option B. Based on crash performance, Option A would be the better option.
11-6.03.03 Crash Reduction Factor

The crash reduction factor (CRF) is the expected reduction in crashes after implementation of a given countermeasure. It should be viewed as intrinsically related to the CMF.

\[
CRF = 1.00 - CMF
\]

11-6.03.04 Crash Modification Factors Clearinghouse

The CMF Clearinghouse is one of the largest and most comprehensive set of crash modification factors currently in use. The website is managed by the Federal Highway Administration (FHWA) and includes high-level summaries of CMFs and links to the actual research papers detailing how the CMF was developed. Currently, nearly anyone can submit a potential CMF to the website. Once received, the submissions are reviewed, and appropriate values are assigned to the reductions. The CMF is also given a star quality ranking that indicates the quality or confidence in the results of the study submitted. More stars indicate a higher quality CMF (five is the most, zero the least). OTE recommends using a CMF of at least three stars.

There are situations when multiple CMFs are available for the same treatment. A careful review should be conducted to ensure the CMF being used matches the project site as closely as possible. The CMF Clearinghouse provides guidance on selecting and using CMFs.

11-6.03.05 Highway Safety Manual

The Highway Safety Manual (HSM) was developed by AASHTO and the first edition was released in 2010. The HSM has several models for calculating the expected number of crashes for various types of segments and intersections. Some of these models have been calibrated for Minnesota conditions. In addition to the models, the HSM has a large number of CMFs that can be used. These CMFs are typically only applicable to the specific model that they are assigned to, making these very reliable when used correctly.

In addition to CMFs related to individual models, the HSM contains a number of additional generic CMFs that may be used (see Appendix D of the manual). Some of the CMFs listed can also be found on the CMF Clearinghouse website.

FHWA provides two free tools that automate the application of HSM methodologies:

- Enhanced Interchange Safety Analysis Tool (ISATe)
- Interactive Highway Safety Design Model (IHSDM)

ISATe is a workbook used for safety performance analysis on small freeway segments. IHSDM is a software suite used to evaluate the safety and operational effects of geometric design decisions on highways.

11-6.03.06 NCHRP 500 Series

The National Cooperative Highway Research Program (NCHRP) is a part of the Transportation Research Board (TRB) of the National Academies. The program conducts research in problem areas that affect highway planning, design, construction, maintenance, operations, and safety. The NCHRP 500 series is a set of publications that primarily focuses on traffic safety and countermeasures that can be used to address specific issues. Though CMFs are not provided specifically, the proposed countermeasures are given a designation of “Proven”, “Tried”, and “Experimental”.

Proven

Strategies that have been used in one or more locations and for which rigorous evaluation has shown them to be effective.
Tried
Strategies that have been implemented at a number of locations and may even be accepted as standards, but for which no rigorous evaluations have been found.

Experimental
Strategies representing suggested ideas that at least one agency has considered sufficiently promising to try as an experiment in at least one location. These strategies should be considered only after others have been determined not to be appropriate or feasible.

11-6.03.07 Additional Sources
There are a wide variety of sources for Crash Modification Factors. Universities and other academic institutions, local technical assistance programs (LTAP), the Minnesota Local Road Research Board (LRRB), MnDOT, and many local transportation/highway agencies often conduct, evaluate, and study many different types of countermeasures. Depending on the sample size, time in place, and type of statistical analysis, these CMFs can provide a realistic understanding of the expected crash modification.

11-6.04 Project Evaluation
11-6.04.01 Evaluation Design
Countermeasure evaluations are utilized to determine the impact of an implemented safety improvement. Evaluations are not normally made until at least one year of crash data after installation has accrued; three years of after data is preferred. In a typical before-after study, the year of installation is excluded from the analysis.

Similar to safety projects, there are many factors for consideration in designing a robust evaluation. Additional factors, including analysis complexity and intended outcome should be weighed. The following table summarizes some common evaluation designs. The number of stars, summed for each of the analysis considerations shown, provides a relative scale for how robust the results are.

<table>
<thead>
<tr>
<th>Evaluation Design</th>
<th>Comparative Rigor</th>
<th>Target Crashes</th>
<th>Control Group</th>
<th>Retrospective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple Before-After</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before-After with Target Crashes</td>
<td>★</td>
<td>★</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before-After with Experimental &amp; Control Groups</td>
<td>★</td>
<td></td>
<td>★</td>
<td></td>
</tr>
<tr>
<td>Retrospective Experimental &amp; Control Groups</td>
<td>★★</td>
<td>★</td>
<td></td>
<td>★</td>
</tr>
<tr>
<td>Retrospective Experimental &amp; Control Groups, Targeted</td>
<td>★★★</td>
<td>★</td>
<td>★</td>
<td>★</td>
</tr>
</tbody>
</table>

Before-after studies evaluate the change in a selected metric, e.g. fatal and serious injury crashes, before and after the implementation of a specific countermeasure. While this straightforward method provides a CRF, until a large body of studies have been completed, findings may be difficult to reproduce.

Analyzing only crashes that would be impacted by a safety improvement, i.e. Target Crashes, provides added focus to the evaluation. Comparing the treatment site(s) to a similar selection of sites, i.e. Control Group, accounts for variation across designs. A retrospective tracks changes in crashes through time rather than categorizing before and after periods; this helps address variation over time.
11-6.04.02 Evaluation Services Provided

Research and evaluation allow us to explore new ways to address existing problems and evaluate the effectiveness of our countermeasures, projects, and programs. Evaluation helps ensure that MnDOT invests in effective and efficient safety countermeasures, projects, and programs.

The Office of Traffic Engineering (OTE) supports this process in three ways: in house professional evaluations, MnDOT supported professional evaluations, and support and review for developing evaluation projects. The OTE Traffic Safety section website provides more information about research and regularly posts existing studies.

OTE monitors and evaluates projects that were programmed with HSIP funds; however, several safety enhancements are programmed outside of the HSIP. A partnership with the districts and OTE safety staff is needed so that safety evaluations are inclusive of all safety deployments and not just HSIP projects. Whenever possible, location details, installation dates, and countermeasures implemented should be recorded and shared with OTE safety staff.

11-7.00 FUNDING AND PROJECT ELIGIBILITY

11-7.01 Highway Safety Improvement Program (HSIP)

11-7.01.01 HSIP Project Priority

HSIP is a federal-aid funding program designed to reduce traffic fatalities and serious injuries on all public roads. Locations must have a significant crash history that includes a fatal or serious injury crash or be identified as a location with multiple risk factors associated with fatal or serious injury crashes at similar locations. The critical crash rate will be used to determine if a significant crash history either fatal, serious, or a combination of both, exists at a particular location. Five years of crash data should be used for this calculation; however, three or 10 years may be considered on a case-by-case basis in consultation with OTE. Additionally, low cost, high impact improvements identified through a risk analysis (e.g. systemic safety plans) will also be considered for HSIP funding. It is anticipated that a balance of risk mitigation and historical crash consideration will be part of HSIP in the foreseeable future.

Two types of projects are candidates for HSIP funding: 1) reactive or sustained crash locations, and 2) systemic, risk-based projects. Sustained crash locations are areas where, statistically, there are a higher number of crashes associated with a particular location when compared to other similar locations throughout the state. Sustained crash locations greatly exceed statewide rates and can be determined by using a critical crash rate to establish if a location has a sustained crash problem. Systemic projects tend to apply known risk factors to address a high frequency but a very low density of crashes. These projects typically deploy cost-effective strategies across many intersections or miles of roadway to be effective.

Two critical crash rates (total crash rate and fatal plus suspected serious injury crash rate) are available to measure if a roadway segment or intersection meets the requirements of a sustained crash location. If a location has a crash rate that exceeds the associated critical crash rate, a benefit cost ratio should be completed to determine the amount of safety impact that can be considered at that particular location compared to the safety investment under consideration.

HSIP projects should be programmed four years in advance. If Year One and Year Two funds are left unallocated after solicitation, then those funds will go to a project or District that can deliver in the necessary time frame.

In addition to HSIP, Minnesota receives funding from the Federal Section 164 program. This is a program that sanctions a state for not meeting certain criteria with its repeat intoxicated driver laws. These funds are transferred away from the Federal-aid funds of two large highway programs and directed to be used for safety programs administered by MnDOT and DPS. These funds are typically evenly split between the two agencies. While HSIP requires a ten percent local match on projects, Section 164 funds can be used without a local match. However, at this time, MnDOT is treating Section 164 funds identically to HSIP.
11-7.01.02 Incidental Safety Improvements

HSIP is not the only source of funding for safety projects and improvements. Districts should be spending an amount equal to or greater than their HSIP goal each year on safety improvements included in larger projects. These types of minor safety improvements shall be installed on each project undertaken on the trunk highway network. The intention of these projects is that they are incidental to the overall scope of the project. In some instances, they are required by a standard or policy in place for the Department. No HSIP funding will be used to offset the costs of these incidental improvements.

11-7.02 Safety Set-Aside Funds

Safety is an integral part of any transportation program. Having specific resources for safety allows programs to be financially effective by taking advantage of cost-effective scheduling. For example, turn lanes may be an appropriate addition to a mill-and-overlay project rather than as a separate project. Whenever possible, larger program funds should be used to fund safety improvements, particularly when they are a relatively small portion of the overall project budget.

Practices vary among the districts regarding set-aside funds to implement improvements. Districts can allocate specific money from their construction funds for safety improvements as identified by the District Traffic Engineer. OTE supports a district set-aside fund to ensure that the priority safety items outside the HSIP program have an opportunity to be funded.

Some districts have opted into this safety investment and have been pleased with the results. This structure provides consistent leadership in a core agency without pitting traffic safety against other projects and while better utilizing the district’s HSIP allocation. By creating set-aside funds specifically for safety, districts can more efficiently invest in agency and regional priorities.