NDDOT
North Dakota
Department of Transportation

INFRASTRUCTURE & DRIVER BEHAVIOR

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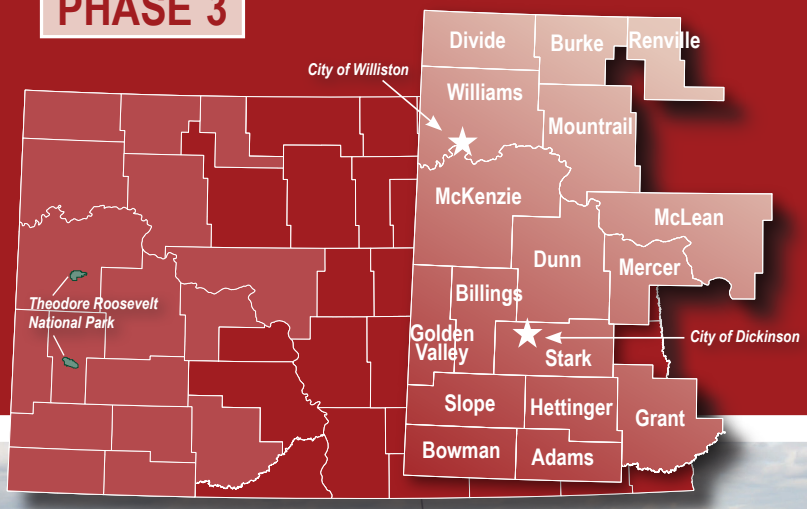
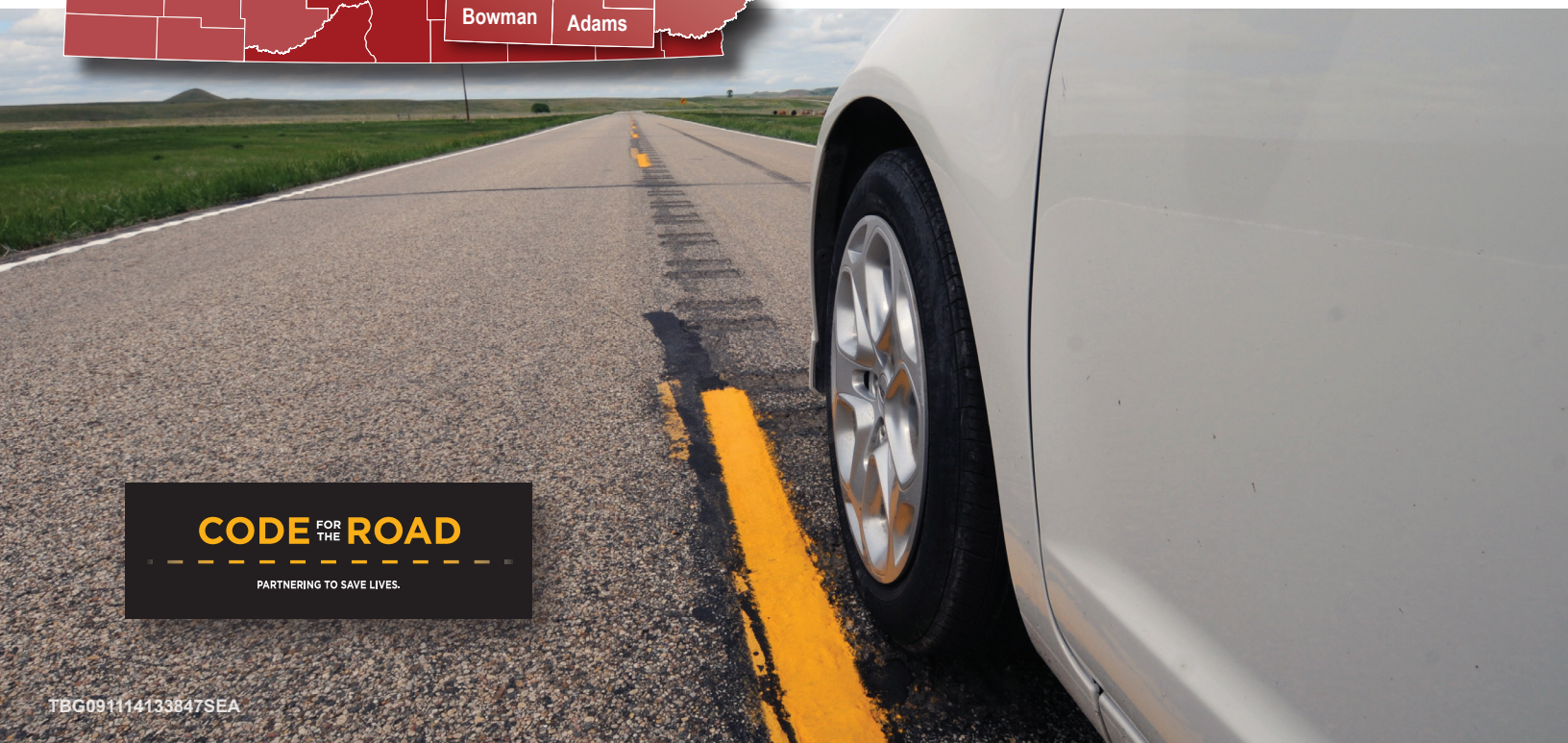


November 2014

North Dakota

Local Road Safety Program



CODE FOR THE ROAD

PARTNERING TO SAVE LIVES.

TBG091114133847SEA

North Dakota
Local Road Safety Program

Prepared by

CH2M HILL

SRF Consulting Group, Inc.

On behalf of

North Dakota Department of Transportation

Grant Levi, P.E., Director

November 2014

TBG040414214530MSP

Contents

Acronyms and Abbreviations

4Es	education, enforcement, engineering, and emergency medical services
100MVMT	100 million vehicle miles traveled
AASHTO	American Association of State Highway and Transportation Officials
ADT	average daily traffic
CMC	county major collector
CMF	crash modification factor
CRS	Crash Reporting System (North Dakota Department of Transportation)
DUI	driving under the influence
EMS	emergency medical services
ERA	edge risk assessment
FHWA	Federal Highway Administration
GDL	graduated driver's license
GHSA	Governors Highway Safety Association
HSIP	Highway Safety Improvement Program
LEAD	Listen, Educate, Ask, Discuss
LRSP	Local Road Safety Program
MHA	Mandan, Hidatsa, and Arikara
mph	miles per hour
MUTCD	*Manual on Uniform Traffic Control Devices*
NCHRP	National Cooperative Highway Research Program
NDDOT	North Dakota Department of Transportation
NDSU	North Dakota State University
NHTSA	National Highway Traffic Safety Administration
NIOSH	National Institute for Occupational Safety and Health
Plan	Local Road Safety Program Plan
PSA	public service announcement
SHSP	Strategic Highway Safety Plan
TraCS	Traffic and Criminal Software
TSO	Traffic Safety Office

Executive Summary

This Local Road Safety Program (LRSP) Plan (Plan) was prepared for the 17 counties (Adams, Billings, Bowman, Burke, Divide, Dunn, Golden Valley, Grant, Hettinger, McKenzie, McLean, Mercer, Mountrail, Renville, Slope, Stark, and Williams) and two cities (Dickinson and Williston) in the western region of North Dakota. The Plan also addresses key routes that make up the highway network for Theodore Roosevelt National Park. The LRSP was prepared as part of North Dakota's statewide highway safety planning process. The contents are the result of a data-driven process, with a goal to reduce severe crashes (defined as those crashes resulting in at least one fatality or incapacitating injury) by documenting at-risk locations, identifying effective low-cost safety improvement strategies, and better positioning the western region to compete for available safety funds. The LRSP includes a description of the connection to safety planning efforts at the national, state (through North Dakota's *Strategic Highway Safety Plan* and the Highway Safety Improvement Program), and regional levels.

The LRSP was commissioned by the North Dakota Department of Transportation (NDDOT) to provide a tool to assist counties and cities in submitting proactive low-cost systemic safety projects for the NDDOT to fund as part of the Highway Safety Improvement Program (HSIP). The LRSP is not intended to be a complete safety plan for the western region, because there may be other safety improvement strategies that are considered high-cost or low-cost that are also effective, but cannot be systematically applied across a county or local road system. While this Plan addresses many of the safety concerns at high-risk locations within the region, other equally important projects may be identified after this safety planning effort is complete.

Specifically, this Plan includes the following:

- Description of the safety emphasis areas.
- Identification of a short list of high-priority, low-cost safety strategies.
- Documentation of at-risk locations along the county/local road systems that are considered candidates for safety investment. At-risk locations include roadway segments, horizontal curves, and intersections with multiple severe crashes or with roadway geometry and traffic characteristics similar to other locations in North Dakota where severe crashes have occurred.
- Development of approximately $16.2 million of suggested safety projects across the western region (Table ES-1), including the completed forms suitable for submittal to the NDDOT for their consideration for HSIP funding. These projects represent the application of high-priority safety strategies at the at-risk locations.
- Discussion of behavioral crash statistics, potential safety strategies, and current statewide resources available for implementation of behavioral safety strategies.

TABLE ES-1
Western Region Total Safety Project Costs

Rural Projects	Roadway Segments	Intersections	Curves	Total
Adams County	$69,471	$84,960	$65,733	$220,164
Billings County	$54,332	$84,360	$90,438	$229,130
Bowman County	$77,652	$148,560	$181,957	$408,169
Burke County	$33,488	$94,200	$18,651	$146,339
Divide County	$82,719	$142,200	$16,355	$241,274
Dunn County	$89,973	$330,360	$42,660	$462,993
Golden Valley County	$36,060	$27,720	$21,240	$85,020
Grant County	$0	$75,240	$96,480	$171,720
Hettinger County	$82,345	$59,520	$18,752	$160,616
McKenzie County	$187,125	$647,760	$111,235	$946,120
McLean County	$140,181	$3,485,940	$49,221	$3,675,343
Mercer County	$366,048	$300,720	$119,618	$786,386
Mountrail County	$51,084	$2,679,780	$24,141	$2,755,005
Renville County	$163,800	$65,880	$137,187	$366,867
Slope County	$7,605	$31,200	$22,107	$60,912
Stark County	$504,203	$375,180	$57,701	$937,085
Williams County	$316,395	$1,626,780	$205,197	$2,148,372
Theodore Roosevelt National Park	$125,700	$13,320	$0	$139,020
Urban Projects	**Roadway Segments**	**Intersections – Right-Angle**	**Intersections – Pedestrians and Bicyclists**	**Total**
Dickinson	$632,667	$8,400	$558,000	$1,199,067
Williston	$596,160	$6,000	$438,600	$1,040,760

The data-driven analytical process that identified lane departure crashes along roadway segments and curves, and right angle and pedestrian/bicycle involved crashes at intersections as safety emphasis areas also identified crashes involving heavy vehicles as a priority in the western region. Statewide, severe crashes involving heavy vehicles accounts for 18 percent of all severe crashes, but over 30 percent of severe crashes in the western region involve heavy vehicles. In addition, 67 percent of all severe heavy vehicle crashes in North Dakota occur in the western region. As a result, addressing heavy vehicle-related crashes is considered a priority in the western region. Further analysis of these crashes determined that more than 80 percent of the heavy vehicle crashes occur on the state highway system. This fact combined with the NDDOT's greater access to financial resources has caused the NDDOT to take the responsibility for analyzing the details about heavy vehicle crashes and take the lead in identifying candidate

locations and then developing and implementing truck related safety projects. Additionally, the predominant crash types for severe heavy vehicle crashes in western North Dakota can be reduced by the suggested systemic projects for county roads and city streets.

The information in this Plan is consistent with best practices in safety planning as presented in guidance prepared by the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), and the National Cooperative Highway Research Program (NCHRP). This information is provided to the highway agencies in the western region in an effort to reduce the number of severe crashes on the county/local road systems. It is understood that the final decision to implement any of the suggested projects resides with the respective county or city officials.

The rankings of county/local roadway facilities are based on a comparison with documented risk factors. There is no expectation or requirement that the highway agencies of the western region pursue safety projects in the exact ranking order. The ranking suggests a general priority, and it is understood that actual project development decisions will be made by county or city staff based on consideration of economic, social, and political issues, as well as in coordination with other projects already in each agency's Capital Improvement Program.

It should also be noted that some of the at-risk locations and suggested safety projects involve the intersection of a county roadway and a state route. It is acknowledged that the county does not have the authority to implement projects on the state's right-of-way. The county is encouraged to coordinate with the NDDOT to pursue a partnership that identifies a path toward implementation. This LRSP: (1) does **not** set requirements or mandates; (2) is **not** a standard; and (3) is neither intended to be nor does it establish a legal standard of care.

To help reduce the potential exposure to claims of negligence associated with motor vehicle crashes on the county/local road system, the following key point should be considered:

- Federal law (23 USC Section 409) established that information generated as part of the statewide safety planning process is considered privileged and unavailable to the public. The privileged status includes crash data where value/detail has been added by analysts during the safety planning process (for example, computation of crash rates, disaggregation of crashes by type or severity, and documentation of contributing factors), the lists of at-risk locations, and information supporting the development and evaluation of potential safety projects. The federal law and the privileged status of the safety information was upheld by the U.S. Supreme Court in the case of Pierce County (Washington) v. Guillen (see Appendix: Risk Management). North Dakota interprets Section 409 to mean that basic crash data are available to the public on request, but that the data cannot be used in legal proceedings associated with claims of negligence.

As with any transportation plan, the expected life of this document is limited. This is because the distribution of crashes can change over time, just as roadway and traffic conditions change, which may contribute to the occurrence of crashes. This Plan contains $16 million of potential safety projects, which could provide the western region with a sufficient backlog of projects for up to 5 years. As a result, the counties and cities are encouraged to periodically update this Plan.

The counties and cities are encouraged to apply for these projects through the NDDOT's HSIP process. The anticipated annual HSIP process is shown in Table ES-2.

TABLE ES-2
HSIP Solicitation Schedule

Month	Task Description
October/November	Solicitation for HSIP is sent out to all counties, districts, metropolitan planning organizations (MPOs), cities, and tribes. The counties, districts, MPOs, cities, and tribes will have about **6 weeks to respond**.
January through March	NDDOT reviews the requests and conducts additional studies if required.
Following Fall	HSIP approval notices are sent after program concurrence from the FHWA. Funding for an approved project will be provided as funding is available.

1.0 Introduction

1.1 Background

To fulfill a commitment in the 2013 North Dakota *Strategic Highway Safety Plan* (SHSP), the North Dakota Department of Transportation (NDDOT) began the Local Road Safety Program (LRSP). The purpose of the LRSP is to better engage local roadway agencies in the statewide safety planning process. The NDDOT's commitment is based on two pieces of information:

- Based on 2007-to-2011 crash records, the SHSP identified that 56 percent of severe crashes (those crashes resulting in at least one fatality or incapacitating injury) in North Dakota occurred on roads operated by local agencies. (Note: More recent crash data from 2009 to 2013 indicates that 44 percent of severe crashes were on local agency roads.)
- The NDDOT had historically focused federal safety funds on interstates, U.S. highways, and state highways, even though only slightly more than half of severe crashes occurred on those facilities.

The NDDOT set out to increase the level of participation of local agencies in safety planning and the amount of safety funds directed toward projects on local systems. To do this, the NDDOT first partnered with local agencies (including all 53 counties and 12 major cities in the state) to prepare safety plans for every region of North Dakota.

> *The Strategic Highway Safety Plan (SHSP) development process was key in helping us identify the importance of local roads to achieve our long-term safety goals. This data-driven process helped us to transition to a systemic identification of crash types on all roads in addition to our traditional crash location (or hot spot) approach on the state system. As a result, the NDDOT has partnered with local stakeholder to prepare road safety plans that will identify potential safety projects consistent with the SHSP.*
>
> — Grant Levi, P.E., Director
> North Dakota Department of Transportation

Representatives from the NDDOT, Adams, Billings, Bowman, Burke, Divide, Dunn, Golden Valley, Grant, Hettinger, McKenzie, McLean, Mercer, Mountrail, Renville, Slope, Stark, and Williams counties; Theodore Roosevelt National Park; and the cities of Dickinson and Williston participated in developing this LRSP Plan (Plan) as Phase 3 of a comprehensive effort to reduce the number of fatal and incapacitating injury crashes (referred collectively as severe crashes) that occur on North Dakota's local road system in the western region. The area covered by the Plan includes portions of NDDOT District 1 – Bismarck, District 4 – Minot, District 5 – Dickinson, and District 7 – Williston (Figure 1-1).

The purpose of this Plan is to identify and implement specific safety strategies at specific locations and to link these projects directly with the contributing factors associated with the majority of severe crashes on the local roads. These safety projects are intended to be comprehensive by addressing both infrastructure- and driver-behavior-related crashes with proactive projects developed through a system-wide risk assessment process. These projects are intended to compliment reactive projects developed through a site analysis approach focused on high-crash locations.

The traffic safety priorities identified in this Plan are the result of a data-driven analysis of nearly 90,980 crashes (including 2,472 severe crashes) on all roads in North Dakota. Of these crashes, 19,368 total crashes and 901 severe crashes occurred in the western region over the 5-year period from 2009 to 2013.

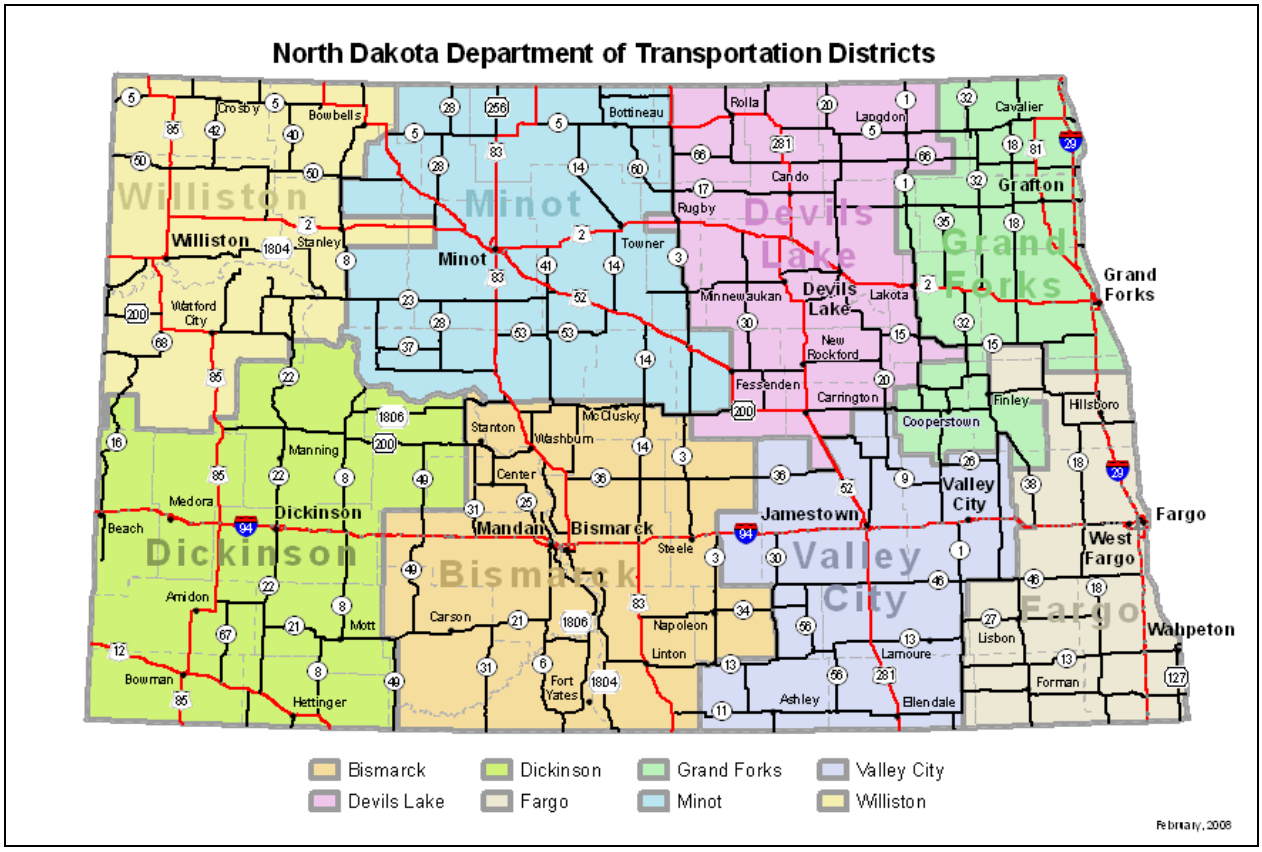


FIGURE 1-1
North Dakota Department of Transportation's Eight Districts

1.2 Traffic Safety – A National Perspective

According to the National Highway Traffic Safety Administration (NHTSA), 33,561 people were killed in traffic crashes in 2012—an average of 92 people killed every day—and an additional 2.4 million people were injured. Nationally, the number of fatalities decreased significantly and steadily in the 1970s and 1980s. Beginning in the early 1990s and continuing through the early 2000s, traffic fatalities began to increase. However, since 2005, traffic fatalities in the U.S. have decreased dramatically to the lowest number of fatalities in recent history—32,479 fatalities in 2011 and 33,561 in 2012.

Like the national trend, the North Dakota traffic fatality rate also decreased in the 1970s and 1980s. Likewise, North Dakota's traffic fatalities slowly increased through the 1990s and early 2000s, and began to decrease again in 2005. However, unlike the national trend, North Dakota's traffic fatality rate has increased since 2008. The 2013 North Dakota Strategic Highway Safety Plan recognizes the following issues likely account for much of the increase:

- Shifts in the age of the driving population.

- Steady increase in the number of vehicle miles traveled in North Dakota, which is counter to the flat or decreasing national trend in travel.
- Other states have a longer history using a systemic investment approach to focus on locations with risk factors for severe crashes.
- The growing challenges of providing emergency medical response and quick access to advanced health care in rural areas.

1.2.1 AASHTO's *Strategic Highway Safety Plan* and Safety Emphasis Areas

In the late 1990s, the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA) supported a comprehensive and data-driven approach to reduce the number of traffic-related fatalities. Both AASHTO and the FHWA concluded that up to that point, states' efforts had not been effective in lowering the number of serious crashes because: (1) efforts were not focused on serious crashes nor the primary factors resulting in severe crashes; and (2) safety project selection was not part of a data-driven process that implemented effective strategies at locations most at risk for the occurrence of a severe crash.

AASHTO and the FHWA recommended a safety program development process that included 22 categories (or safety emphasis areas) in the areas of drivers, special users, vehicles, highways, emergency services, and management. The objective of this first step is to help agencies consider the 4Es of safety—engineering, education, enforcement, and emergency medical services (EMS)—when identifying safety priorities for their roads. In addition, selecting safety emphasis areas focuses agencies on safety strategies linked to the issue.

In 2007, AASHTO set a goal to reduce the number of traffic fatalities nationally by 1,000 each year for the next 20 years, which is an integral first step in a national *Toward Zero Deaths* safety vision. The FHWA has determined that this goal will be reached only by partnering with individual states. This partnering will lead to more successful project implementation and will result in programs that target the factors contributing to the greatest number of fatal and incapacitating injury crashes.

1.3 North Dakota's Statewide Safety Planning Efforts

In 2004, North Dakota had a fatality rate of 1.34 fatalities per 100 million vehicle miles traveled (100MVMT) that was less than the national average (1.44 fatalities per 100MVMT). However, in recent years, the North Dakota fatality rate (1.47 fatalities per 100MVMT in 2013) has risen to above the national average (1.11 fatalities per 100MVMT) and the overall number of traffic fatalities have gradually increased (see Figure 1-2). In 2012, there were 170 fatalities on North Dakota roads; the most traffic fatalities reported in the state since 1982. In 2013, the number of North Dakota traffic fatalities decreased to 148, the same number as in 2011.

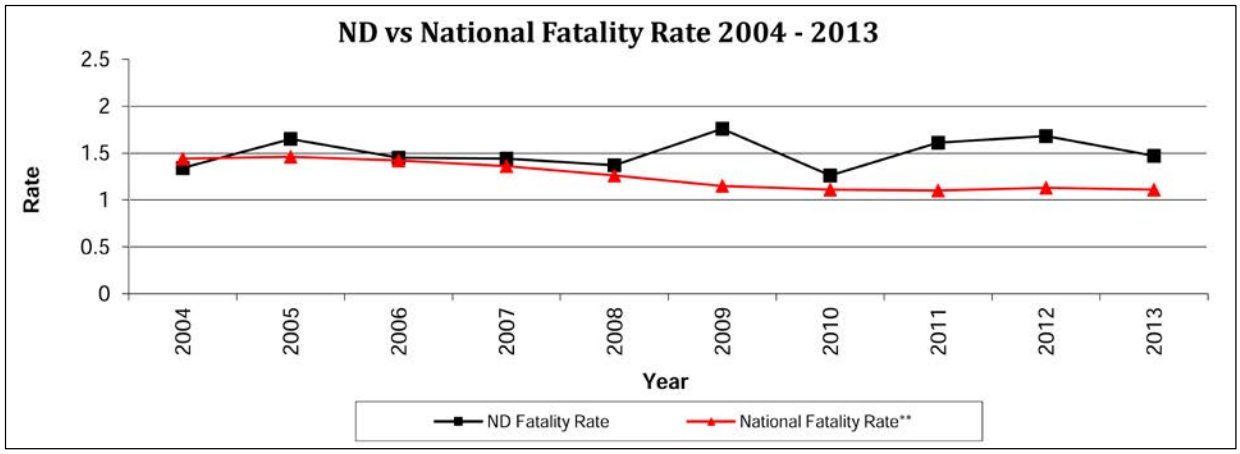


FIGURE 1-2
Fatality Rate – National and North Dakota (2004 to 2013)

In 2013, the NDDOT updated the state's SHSP. Based on severe crashes (Table 1-1), the 2013 SHSP identified the following safety emphasis areas, as well as priority safety strategies in each area:

- Young drivers (under age 21)
- Speeding or aggressive driving
- Alcohol-related
- Unbelted vehicle occupants
- Lane departure
- Intersections

North Dakota also adopted a long-term vision of zero fatalities on its roadways. Achieving this vision will require many years and dramatic shifts in the safety culture for North Dakota residents. An aggressive intermediate goal was set to reduce the 3-year average of traffic fatalities to 100 or fewer by 2020.

TABLE 1-1
North Dakota Fatal and Severe Injury Crashes by AASHTO Safety Emphasis Area

Safety Emphasis Area		Statewide Crashes (All Roads)	
		Percent	Number
Drivers	**Involving Drivers Under Age 21**	**22%**	**501**
	Involving Drivers Over Age 64	13%	280
	Speeding or Aggressive Driving	**26%**	**576**
	Alcohol-Related	**30%**	**667**
	Distracted, Asleep, or Fatigued Drivers	9%	206
	Unbelted Vehicle Occupants	**48%**	**1,067**
Special Users	Pedestrians	5%	117
	Bicycle	2%	46
Vehicles	Motorcycles	12%	265
	Heavy Vehicle	15%	342
Highways	Train-Vehicle Collisions	1%	13
	Lane-Departure **Including both lane-departure (898 severe crashes) and head-on/ sideswipe-opposing crashes (150 severe crashes)**	**47%**	**1,048**
	Intersections	**23%**	**513**
	Work Zone	2%	36
Total Severe (Fatal and Incapacitating Injury) Crashes		**2,231**	

Notes:
Information is from the 2008-to-2012 North Dakota crash data records, which is an update to the information in the 2013 North Dakota SHSP that used 2007-to-2011 crash records.
Numbers in this table do not add up to the statewide crash numbers because one crash may be categorized into multiple emphasis areas. For example, one crash may involve a young driver at an intersection and, therefore, be included in both of these emphasis areas.

1.4 Local Road Safety Program Overview

North Dakota's local road system encompasses more than 97,500 miles of roadway, out of approximately 106,000 miles statewide. Although, historically, more than 50 percent of severe crashes in North Dakota occurred on local roads, the density of these crashes was very low (approximately 0.002 severe crash per mile per year). As a result, local agencies were unable to identify high-crash locations to nominate for funding through the Highway Safety Improvement Program (HSIP). Therefore, using stand-in data for the severe crashes, safety projects were identified using a systemic process to evaluate at-risk locations. The use of the systemic process was necessary due to the low crash density. Based on revised FHWA policy, the NDDOT expanded the HSIP to include projects identified through the systemic analysis of local roads.

The focus areas of the systemic risk assessment are rural, paved county[1] and National Park highways, and urban arterials and collectors in North Dakota's larger cities (cities with a population greater than 5,000). Paved, rural county highways were selected based on an analysis of statewide crash data that indicated that approximately 55 percent of severe local road crashes occurred on rural county roads. Of these crashes, approximately 40 percent occurred on paved roads, which account for less than 10 percent of county roads (approximately 6,200 miles). Further analysis indicated that on these rural highways, the most at-risk elements were roadway segments (76 percent of severe crashes), horizontal curves (31 percent of severe crashes), and intersections (18 percent of severe crashes).

Major cities were selected as a focus because approximately 90 percent of the severe local-road crashes occurred within the city boundaries of the 12 cities in this category. Furthermore, 56 percent of the severe crashes occurred on urban arterials and collectors. In addition, because these 12 cities are responsible for operation and maintenance of U.S. highway and state highway routes within the municipal limits (not including fully access-managed facilities, such as freeways), the U.S. and state highways were included in the review.

Figure 1-3 shows the approach used to develop this Plan for the western counties. The process began with the crash analysis and concluded with this Plan, the culmination of the NDDOT and concerned local agencies working together for nearly half a year.

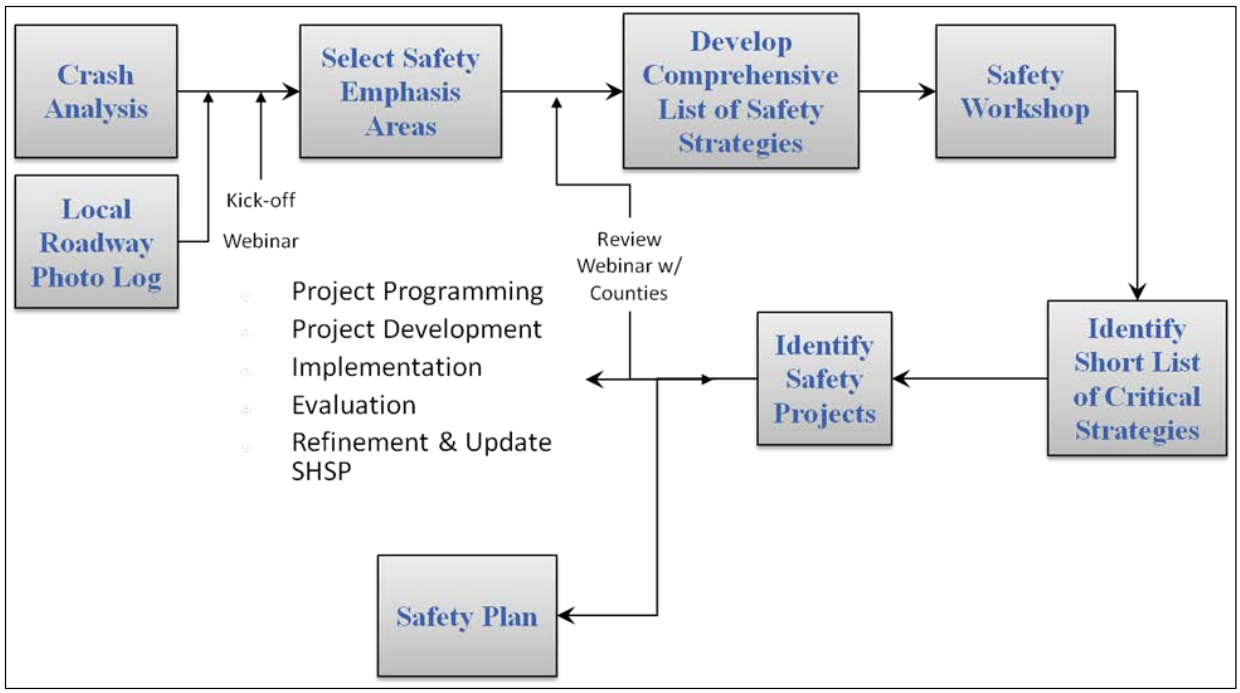


FIGURE 1-3
Local Road Safety Program Safety Plan Approach

[1] Does not include all paved roads outside municipal limits, but focuses on routes that serve regional travel. For example, a loop road that is paved and yet only provides access to a residential neighborhood was considered to be a local road given the type of traffic served by the facility.

2.0 Western Region Safety Emphasis Areas and Crash Overview

The first step in the process to prepare this Plan for the western region was to conduct a crash analysis overview statewide for North Dakota and then for the western region as a whole.

2.1 Western Region Crash Overview

2.1.1 North Dakota Crash Mapping

Crash data was taken from the NDDOT Crash Reporting System (CRS) and placed into ArcGIS for data exportation based on specific locations relative to local roads. The most recent 5-year period of crash data (from 2009 to 2013) was analyzed and used to determine risk factors specific to the local roads in the western region, which includes Adams, Billings, Bowman, Burke, Divide, Dunn, Golden Valley, Grant, Hettinger, McKenzie, McLean, Mercer, Mountrail, Renville, Slope, Stark, and Williams counties; Theodore Roosevelt National Park; and the cities of Dickinson and Williston. Consistent with the NDDOT's SHSP, the analysis focused on severe (fatal and incapacitating injury) crashes.

2.1.2 Facilities Analyzed

The crash analysis was separated into three main facility types: roadway segments, curves, and intersections:

- Paved rural local roadway segments and local county major collector (CMC) gravel roads were analyzed for multiple crash locations. Other local gravel roads were removed from the analysis because of the relatively low percentage of severe crashes and due to the lack of infrastructure-based strategies that can be applied to this roadway type.
- Local rural road intersections with state highways or other local roads were included in the analysis. Local non-CMC gravel roads intersecting with other local roads were removed from the analysis due to the very low number of crashes at these intersections.
- Horizontal curves on paved rural local roads were included in the analysis.
- Urban roadway segments and intersections were analyzed in the cities of Dickinson and Williston. The following urban roadway types within the city limits were analyzed:
  - State routes
  - Urban principal arterials
  - Urban minor arterials
  - Urban collector roads
- All other local roadway segments and intersections, including gravel roads, were reviewed for locations with multiple severe crashes or "hot spots."

2.1.3 Crash Data Sets

Crash data for the 5 years from 2009 to 2013 was used for the western region crash analysis. In safety analysis, it is recommended that more than 1 year of data be studied to reduce the possibility of examining an unusual year. It is also important to include as many years as necessary to produce a data set that will provide statistically reliable results but not too long so that changed conditions are a concern (for example, reconstructed roads, addition of STOP signs, and changed speed limits). For the western region, there were not enough crashes to be statistically reliable; therefore, decisions also considered crashes for all Phase 1, 2, and 3 cities and counties combined, statewide data (Figure 2-2), or national research.

The western region data set includes 8,686 crashes on local roads; of these, 336 were fatal or incapacitating injury crashes. Disaggregating the severe crashes by road type (paved, gravel, or local), area (urban versus rural), and crash type category (intersection versus roadway segment crashes) resulted in the distribution shown in Table 2-1, Figure 2-1, and Figure 2-2.

TABLE 2-1
Severe Crash Distribution (2009 to 2013)

Location	Western Region (Percent/Number)	Statewide (Percent/Number)
Rural Roads	**69% (232 crashes)**	**55% (594 crashes)**
Paved Rural Roads	*36% (83 crashes)*	*40% (237 crashes)*
CMC Gravel Roads	*14% (33 crashes)*	*12% (71 crashes)*
Paved Rural Road Segments	**78% (64 crashes)**	**76% (173 crashes)**
Single Vehicle, Lane-Departure Crashes on Paved Rural Road Segments	*81% (52 crashes)*	*83% (143 crashes)*
Paved Rural Road Intersections	**18% (15 crashes)**	**20% (46 crashes)**
Paved Rural Road Thru-STOP Intersections	*40% (6 crashes)*	*50% (23 crashes)*

This review shows that, on the local system, severe lane-departure crashes on paved roads and angle crashes at Thru-STOP intersections were overrepresented. Based on statewide traffic safety data, severe lane-departure crashes along curves are also overrepresented.

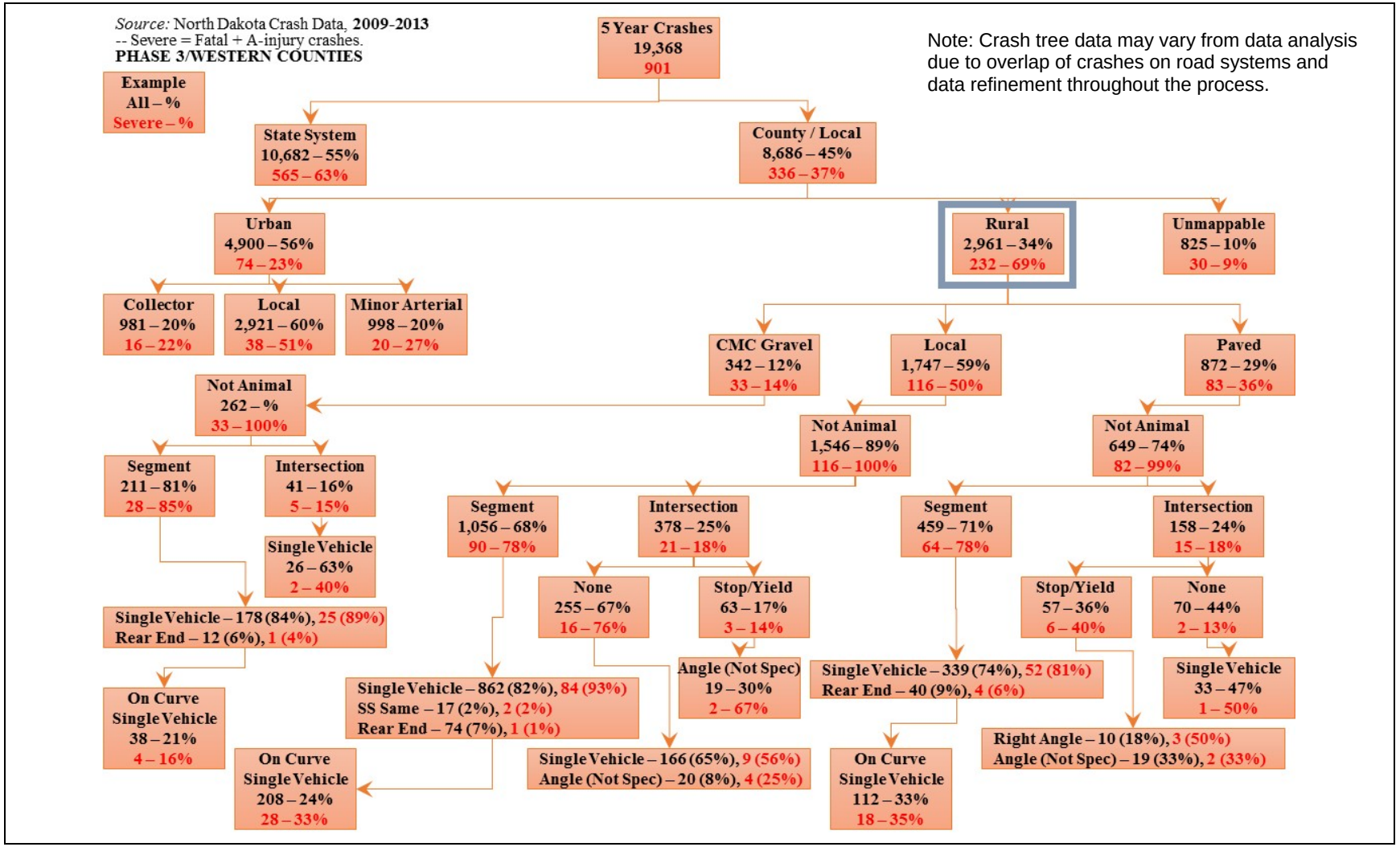


FIGURE 2-1
Western Region Crash Data Overview – Rural and Urban Local Road Systems (2009 to 2013)

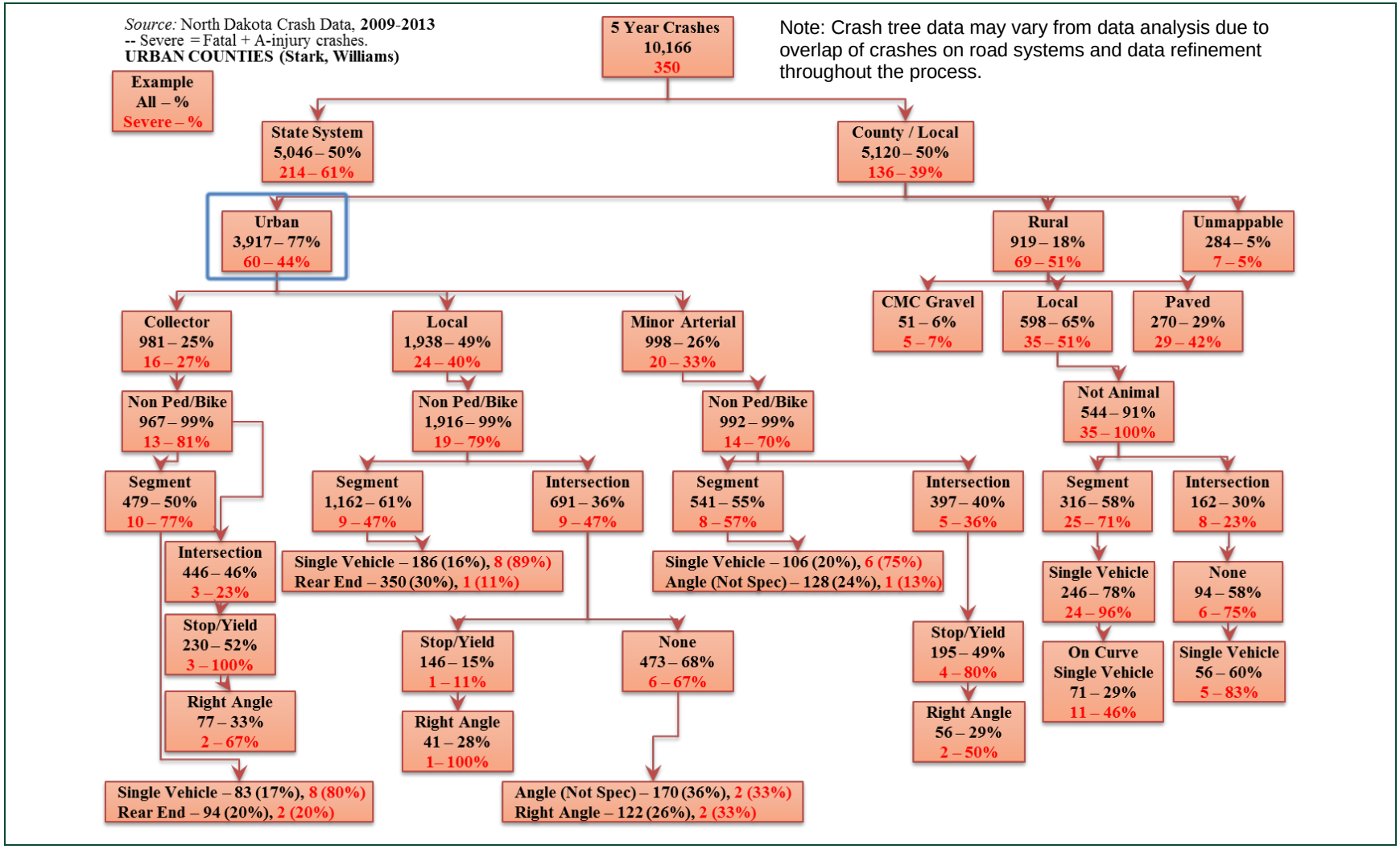


FIGURE 2-1 (Continued)
Stark County/City of Dickinson and Williams County/City of Williston Crash Data Overview – Rural and Urban Local Road Systems (2009 to 2013)

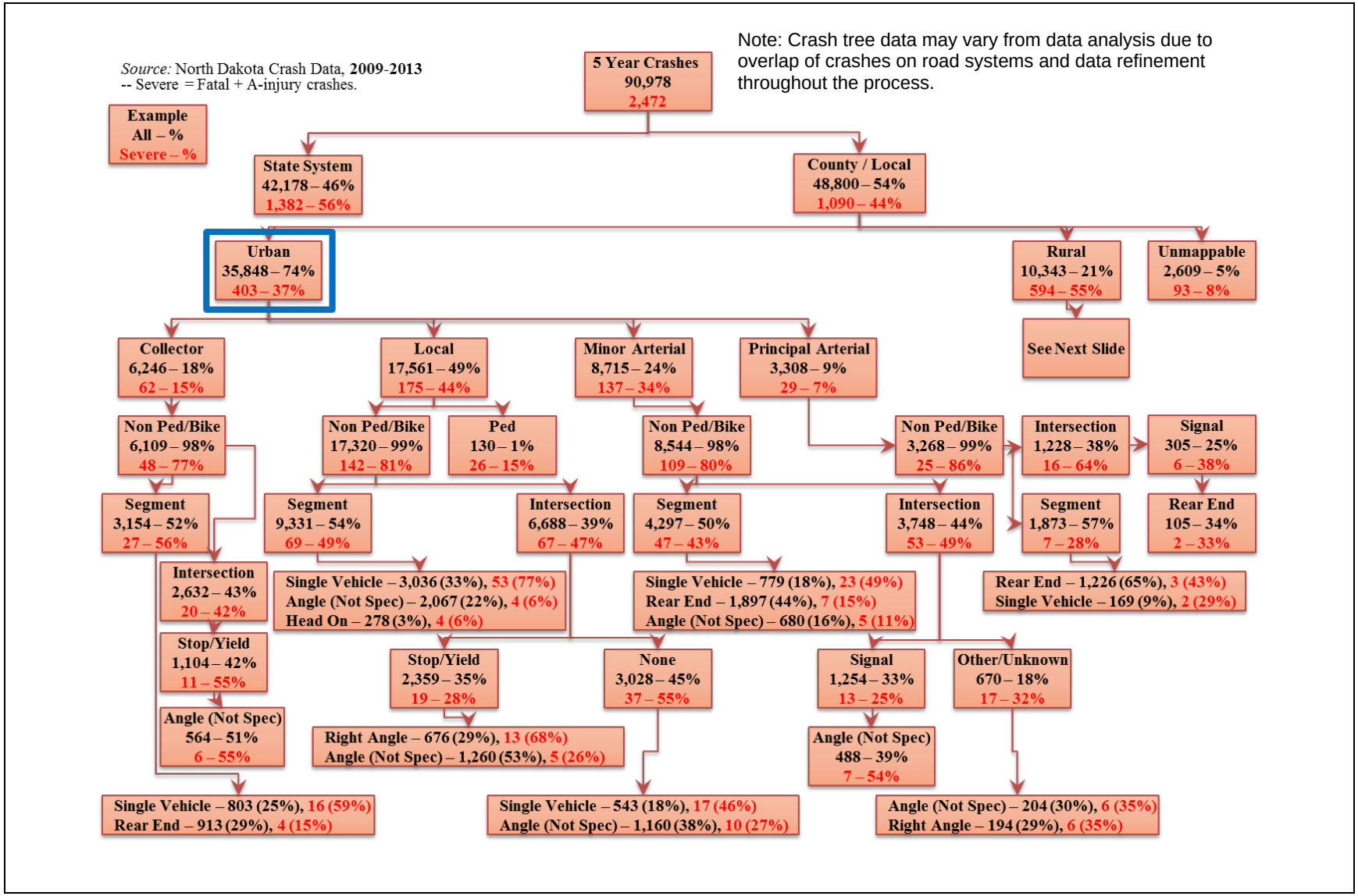


FIGURE 2-2
North Dakota Crash Data Overview – Rural and Urban Local Road Systems (2009 to 2013)

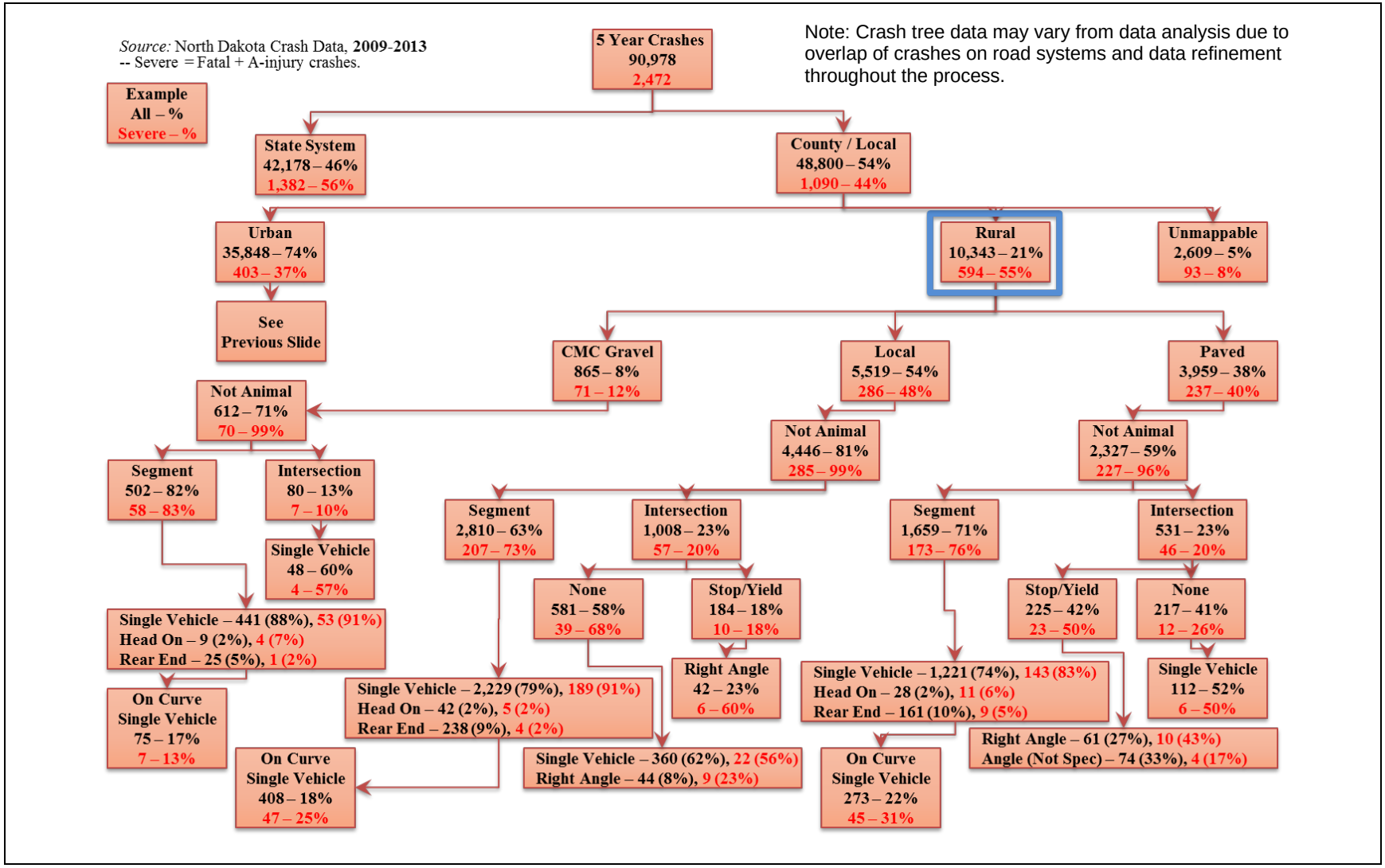


FIGURE 2-2 (Continued)
North Dakota Crash Data Overview – Rural and Urban Local Road Systems (2009 to 2013)

2.2 Western Region Safety Emphasis Areas

The total number of severe crashes (those crashes resulting in a fatality or incapacitating injury) in each county over the 5-year period from 2009 to 2013 was so few that the crash data was analyzed at regional, statewide, and national levels for various risk factors.

Section 1.2 described the development of AASHTO's emphasis areas, and how this process was applied to the State of North Dakota to identify statewide safety emphasis areas (Table 1-1). An identical process was followed for the western region, resulting in the distribution of severe crashes among AASHTO's 22 emphasis areas (Table 2-2). The safety emphasis areas for the western region are consistent with the state's emphasis areas. This process revealed where crashes were overrepresented based on a comparison to statewide averages or where a large enough number of crashes represented an opportunity to substantially reduce crashes. As a result, the following safety emphasis areas were identified as priorities for safety investments:

- Driver Behavior – Young drivers, aggressive drivers, alcohol-related, and unbelted vehicle occupants
- Highways – Lane departure and intersection crashes

This data driven process that identified the driver behavior and infrastructure safety emphasis areas also identified crashes involving heavy vehicles as a priority in the western region. Statewide, severe crashes involving heavy vehicles accounts for 18 percent of all severe crashes, but over 30 percent of severe crashes in the western region involve heavy vehicles. In addition, 67 percent of all severe heavy vehicle crashes in North Dakota occur in the western region. As a result, addressing heavy vehicle related crashes is considered a priority in the western region. However, further analysis of these crashes determined that more than 80 percent of the heavy vehicle crashes occur on the State's system of highways. This fact combined with the NDDOT's greater access to financial resources led the NDDOT to take the responsibility for analyzing the details about heavy vehicle crashes. This will also include leading the effort to identify candidate locations and then developing and implementing truck related safety projects.

TABLE 2-2
Western Region Severe Crashes by Safety Emphasis Areas (2009 to 2013)

Safety Emphasis Areas	Statewide (% of Total)	2009 to 2013 Severe Crashes					
		Western Region		State Roads		Local System	
		%	#	%	#	%	#
Total Severe Crashes	**2,472**	**901**		**565**		**336**	
Involving Drivers Under Age 21	21%	17%	157	15%	84	22%	73
Involving Drivers Over Age 64	12%	8%	71	9%	53	5%	18
Excessive Speed or Aggressive Driving	25%	26%	232	22%	126	32%	106
Alcohol-Related	29%	29%	265	24%	137	38%	128
Distracted, Asleep, or Fatigued Drivers	8%	7%	65	8%	45	6%	20
Unbelted Vehicle Occupants	48%	46%	414	41%	229	55%	185
Pedestrian	5%	3%	27	2%	9	5%	18
Bicycle	2%	1%	7	<1%	1	2%	6
Motorcycle	11%	7%	62	7%	41	6%	21

TABLE 2-2
Western Region Severe Crashes by Safety Emphasis Areas (2009 to 2013)

Safety Emphasis Areas	Statewide (% of Total)	2009 to 2013 Severe Crashes					
		Western Region		State Roads		Local System	
		%	#	%	#	%	#
Heavy Vehicle	18%	30%	270	38%	217	16%	53
Train-Vehicle Collisions	1%	1%	5	0%	0	1%	5
Lane-Departure (Run-Off-the-Road and Head-On)	45%	52%	466	46%	262	61%	204
Head-On	***8%***	***9%***	***84***	***13%***	***75***	***3%***	***9***
Run-off-the-Road	***38%***	***42%***	***382***	***33%***	***187***	***58%***	***195***
Intersection	28%	25%	223	27%	152	21%	71
Work Zone	2%	2%	21	3%	18	1%	3
Deer Collisions	1%	<1%	2	<1%	2	0%	0
Adverse (Winter) Weather Related	17%	17%	151	21%	116	10%	35

Note:
Severe crashes are those crashes that result in at least one fatality or incapacitating injury.

Strategies to reduce severe crashes depend on whether a safety emphasis area is infrastructure-based or driver-behavior-based. Infrastructure-based emphasis areas refer to characteristics of the location (for example, a roadway segment, curve, or intersection) where crashes occurred. Driver-behavior-based emphasis areas refer to motorist characteristics or actions that contribute to crashes. Because driver behavior is tied to laws made at the national and state levels, roadway agencies generally have less ability to address driver-behavior-based emphasis areas. The most effective approach for road authorities to address driver-behavior-based emphasis areas is to focus on public education and law enforcement through cooperation and collaboration with other county departments, agencies, and schools. Generally, more opportunities exist for county and city road authorities to address infrastructure-based emphasis areas, because many of the associated strategies can be implemented as separate roadway improvement projects, or along with other planned improvements. Specific infrastructure- and driver-behavior-based strategies presented to the participants of the safety workshop held for the western region are provided in Section 3.2.

2.3 Crash Risk Factors

The objective of the analytical process is to identify candidates for safety investment based on two criteria: high-crash locations and at-risk locations. A more detailed crash analysis was performed for each priority crash type to identify: (1) locations where these priority crash types occur at a rate of one or more severe crashes per year, and (2) basic roadway and traffic characteristics of locations with severe crashes. These characteristics are not considered to be the cause of crashes, but instead are used to determine the risk that a future severe crash may occur at a particular location. Information from historic crashes was used to evaluate the remainder of the region's local road system and prioritize locations for safety investment based on similar characteristics.

Urban counties are designated as those containing a city with a population greater than 5,000, while rural counties are those without cities exceeding this population. The cities of Dickinson and Williston are the subjects of the urban portion of this Plan for Phase 3 urban areas.

2.3.1 Rural Roadway Segments – Crashes on Paved Roads

Of the more than 97,500 miles of local road system in North Dakota, only 7 percent of the roads are paved. However, 40 percent of crashes occured on paved roads. Therefore, the focus of the LRSP is on rural paved roadway segments.

There are 1,141 miles of rural paved county roads in the western region. From 2009 to 2013, 83 severe crashes were reported on these roads. The predominant crash type on these roads was single-vehicle (Figure 2-3). The following five risk factors were identified for rural lane departure crashes on paved roads in the western region counties:

1. **Average Daily Traffic (ADT) –** Of the rural paved roads, 28 percent have an ADT greater than 450 vehicles per day. However, 57 percent of the severe lane departure crashes occurred above this ADT (Figure 2-4). Therefore, any segment with an ADT greater than 450 vehicles per day received a star.
2. **Access Density –** Nationally, research has shown that an access density of eight or more access points per mile (including field entrances, commercial entrances, roadway access, etc.) increased the likelihood of a severe crash occurring. North Dakota's review of severe crashes on their rural county roads (shown in Figure 2-5) demonstrates a similar relationship with a slightly lower threshold of six access points per mile. Therefore, any roadway segment with an access density greater than or equal to six access points per mile received a star.
3. **Lane-Departure Crash Density –** The average lane-departure crash density for the western region was 0.065 crash per mile. Due to limited number of crashes in each county, any roadway segment where the lane-departure crash density was greater than the average for the western region received a star.
4. **Critical Radius Curve Density –** Nationally, lane-departure crashes frequently occur within curves. Curves with radii between 500 and 1,200 feet (that is, critical radius curves) have a higher severe crash rate than other curves and roadway segments with more curves in this range are considered to have greater risk. The risk factor is determined by the number of critical radius curves divided by the length of the segment. The average critical curve radius density for these types of curves along roadway segments was 0.253 curve per mile for the western region. Any segment with a critical radius curve density greater than or equal to the region average received a star.
5. **Edge Risk Assessment (ERA) –** A rating system was developed to categorize the risk level of vehicles leaving the travel lane. Roads with a usable shoulder and reasonable clear zone received a rating of 1. Roads with little or no usable shoulder but with a reasonable clear zone received a rating of 2, as did roads with a usable shoulder but with fixed objects in the clear zone. Roads with no usable shoulder and fixed objects in the clear zone received a rating of 3. Examples of these edge risks are shown in Figure 2-6. Roads were evaluated using photos taken in the autumn of 2013 to determine the rating. Roads with a rating of 2 or 3 received a star.

Detailed segment analyses and results for the counties are provided in Chapter 4. A prioritization process for each roadway segment was put into place using the five risk factors by giving stars to each risk factor present. The highest-priority roadway segments received the most stars. In cases where roadway segments received the same number of stars, the ERA, and ADT were used to break the tie.

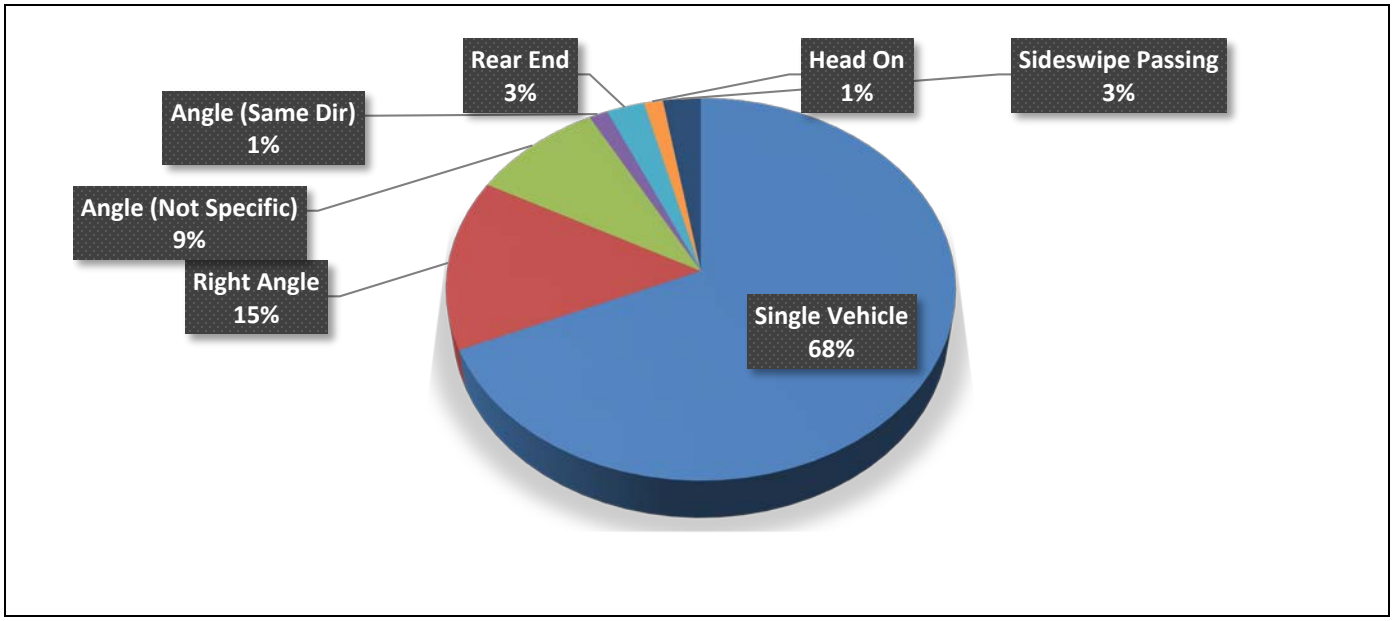


FIGURE 2-3
Severe Crash Types on Rural Paved Road Segments in the Western Region (2009 to 2013)

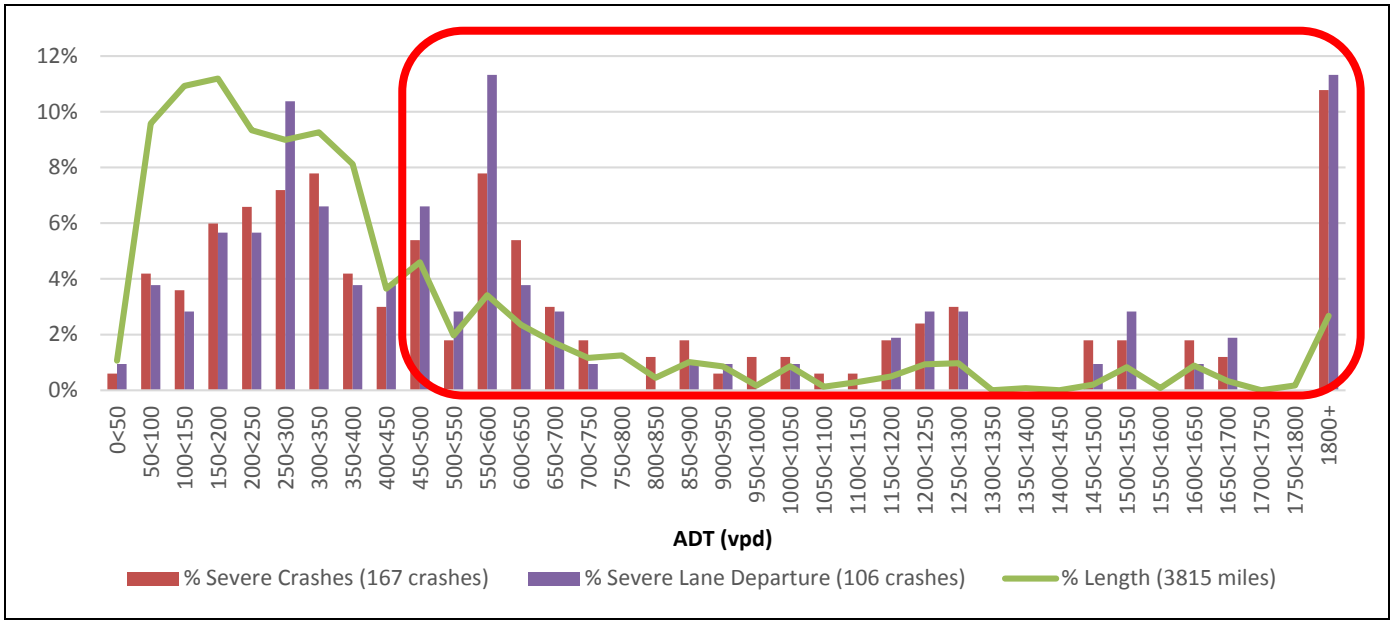


FIGURE 2-4
Rural Roadway Segment Average Daily Traffic (ADT) Crash Data for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

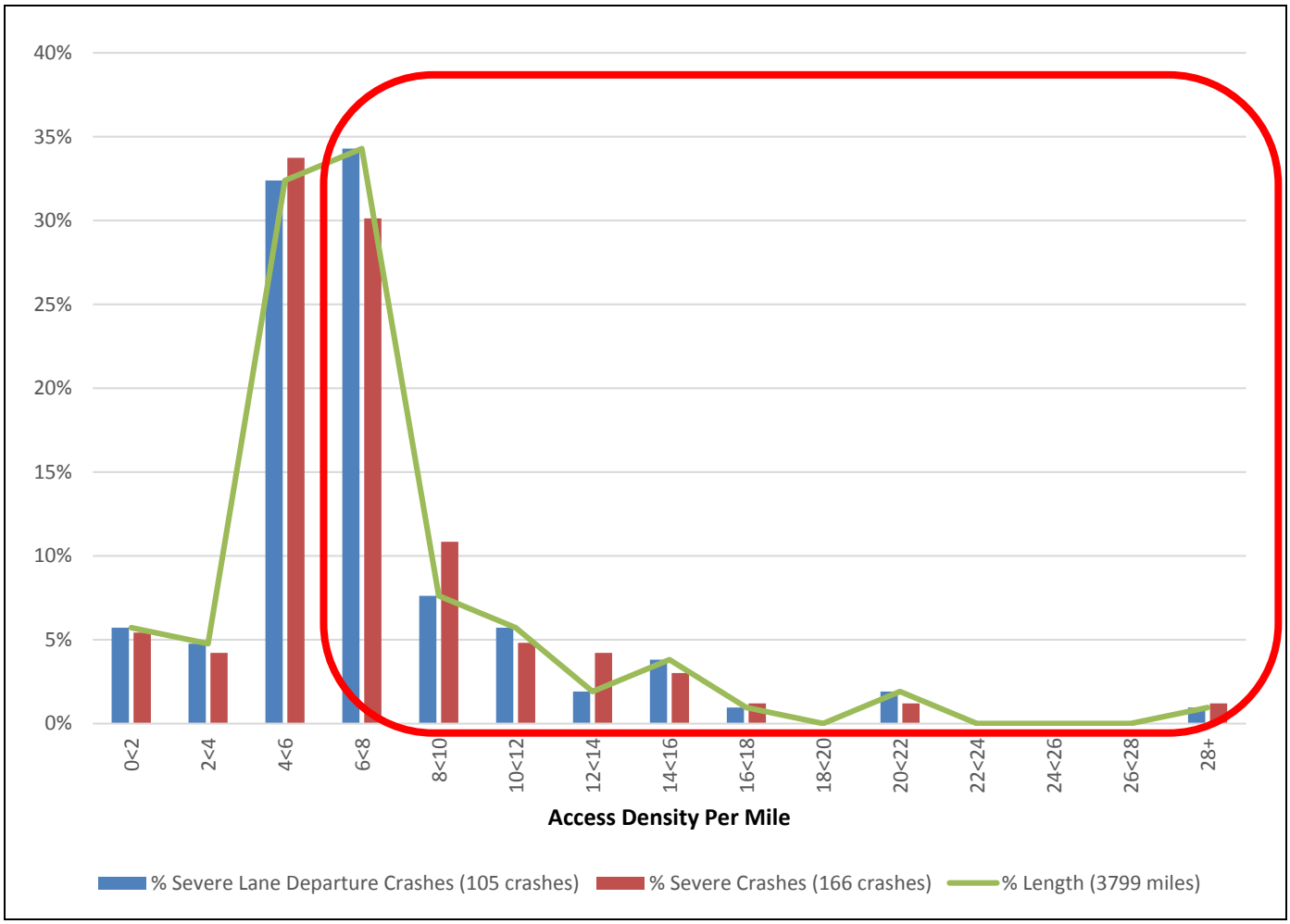


FIGURE 2-5
Severe Crashes by Access Density on Rural County Roads for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

1 – Usable Shoulder, Reasonable Clear Zone

2 – No Usable Shoulder, Reasonable Clear Zone

2 – Usable Shoulder, Roadside with Fixed Obstacles

3 – No Usable Shoulder, Roadside with Fixed Obstacles

FIGURE 2-6
Sample Edge Risk Assessment Ratings and Descriptions

2.3.2 Rural Curves – Crashes on Paved Roads in Curves

Detailed crash analysis included horizontal curves on rural paved local roads. Research indicates horizontal curves with certain characteristics contribute to the overall frequency of lane-departure crashes. The 1,141 miles of rural paved roads in the western region contain 776 curves totaling approximately 131 miles in length (11 percent of the road system mileage).

With only 27 severe crashes along curves reported from 2009 to 2013, too few crashes occurred on these curves to serve as a reliable indicator of the relative degree of risk. However, data for all counties show the importance of safety improvements on curves to reduce severe crashes since many severe lane-departure crashes occur in curves. As a result, the LRSP team used characteristics of curves in the county where crashes had occurred, as well as available information from similar analysis of national and statewide data. Results from *Cost-Benefit Analysis of In-Vehicle Technologies and Infrastructure Changes to Avoid Crashes Along Curves and Shoulders* (compiled by the University of Minnesota and CH2M HILL in June 2009) were also used in curve analysis and prioritization.

Based on a review of these sources, the following five risk factors were identified for crashes along curves:

1. **Curve Radius –** The western region and all counties in Phases 1 through 3 did not have enough severe curve crashes to provide insight into North Dakota's characteristics (Figure 2-7). National data shows that curves with mid-range radii had higher crash densities. An upper limit of 1,200 feet was used for at-risk curves, because 1,200 feet is a 60-mile-per-hour (mph) design speed based on AASHTO's *A Policy on Geometric Design of Highways and Streets* (commonly referred to as the "Green Book;" 6th edition, 2011). A lower limit of 500 feet was used to represent the severe lane-departure crashes that were reported in the region from 2009 to 2013. Any curve with a radius between 500 and 1,200 feet received a star.
2. **Average Daily Traffic (ADT) –** Traffic volumes over 450 vehicles per day represent a higher risk for crashes (Figure 2-8). In the western region, 74 percent of severe lane-departure crashes occurred along curves with this ADT, while only 37 percent of curves are represented in this range. Therefore, curves with an ADT over 450 vehicles per day received a star.
3. **Intersection within the Curve –** In the western region, the presence of an intersection within a curve increased the risk for a severe crash. Curves with at least one intersection within the curve received a star.
4. **Visual Trap –** A visual trap exists when the crest of a vertical curve is located before a horizontal curve or where a minor road, tree line, or line of utility poles continues on a tangent to the curve, thereby creating the illusion that the road continues straight ahead (Figure 2-9). The presence of a visual trap increased the risk of crashes in the western region and, therefore, received a star.
5. **Severe Crashes –** If a severe crash occurred on a curve between 2009 and 2013, the curve received a star.

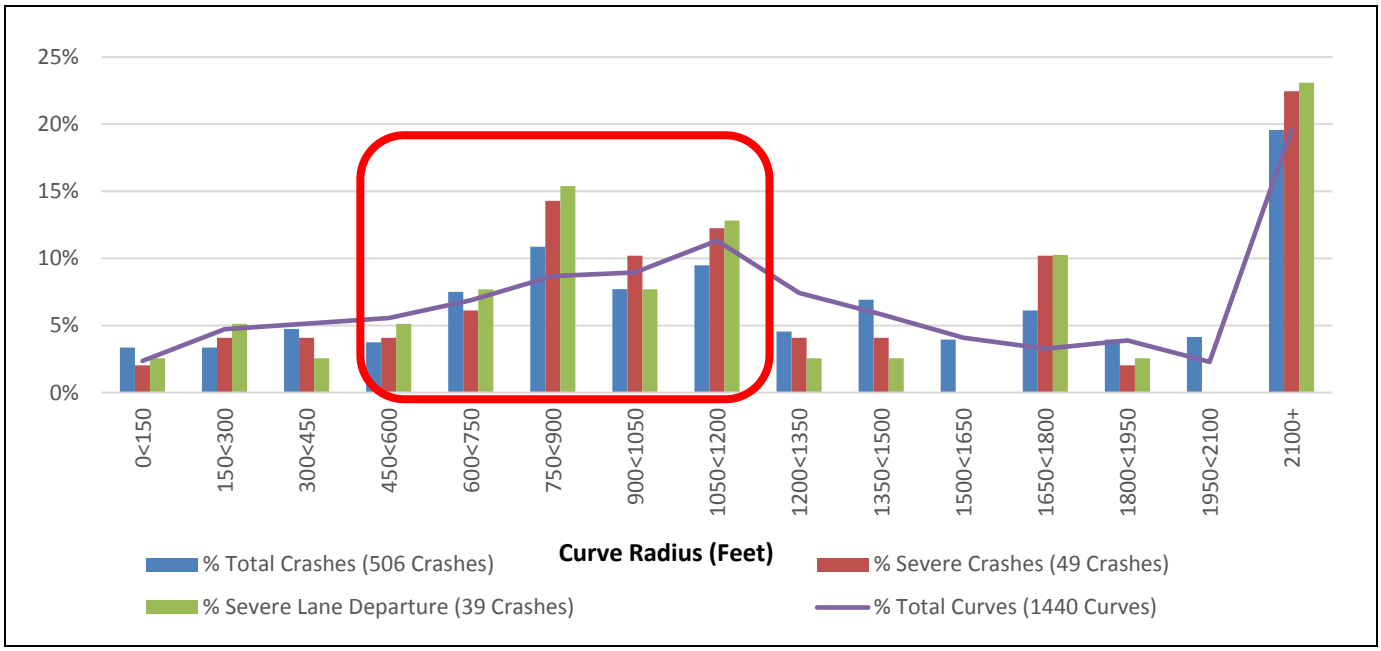


FIGURE 2-7
Rural Curve Crashes by Radii – 500 to 1,200 feet for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

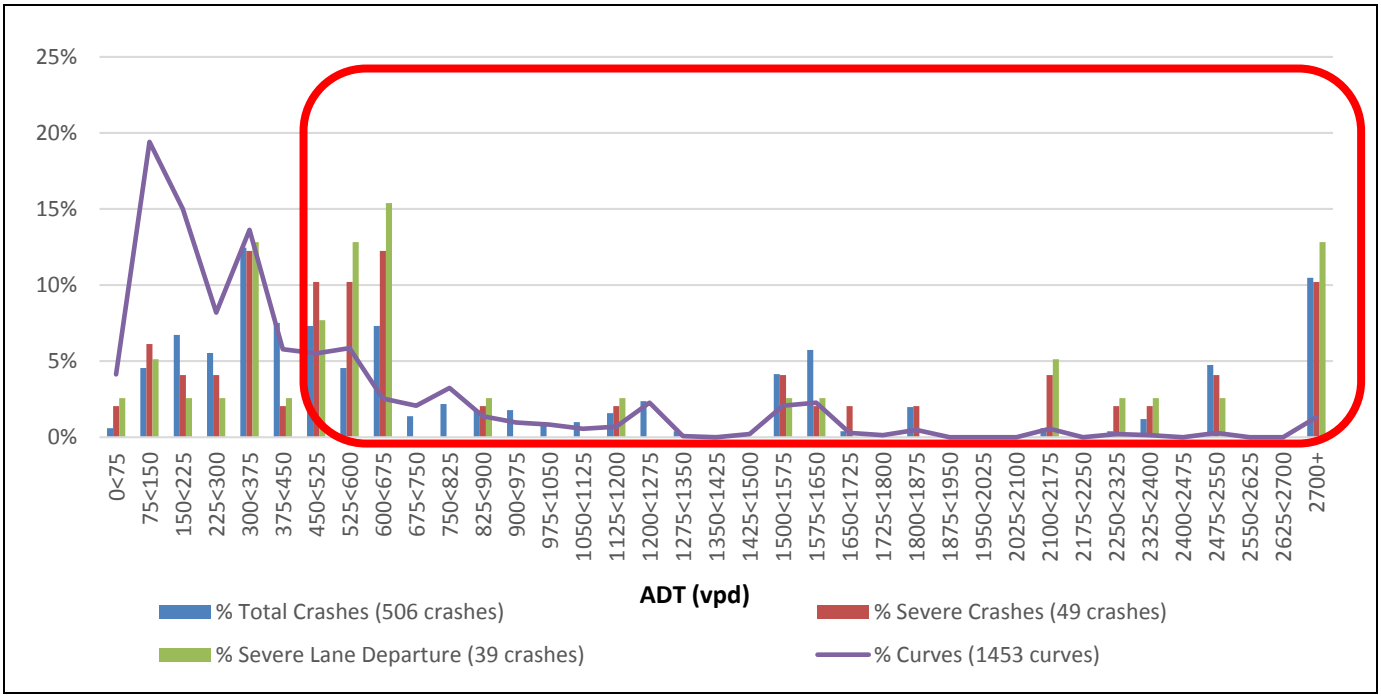


FIGURE 2-8
Rural Curve Crashes by Average Daily Traffic (ADT) – Greater than 450 Vehicles per Day for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

FIGURE 2-9
Example of a Visual Trap – Minor Road Intersects Roadway on a Curve

Based on 240 total crashes and 22 severe lane-departure crashes along the curves on western region rural roads, those with intersections and visual traps have a higher crash density (are more at risk) than those without such features. These risk factors have also been observed nationally.

Detailed curve analyses and results for the counties are provided in Chapter 4. The five risk factors were used to prioritize curves in the county, with the highest-priority curves receiving the most stars. Curves were reviewed for proximity to high-priority curves and existing conditions as well.

Curves in the western region were screened for compliance with the *Manual on Uniform Traffic Control Devices* (MUTCD; 2009) requirement regarding traffic signs at horizontal curves. Under this requirement, a curve must have an advance horizontal alignment warning sign if the daily traffic is greater than 1,000 vehicles per day and if speed differentials (the difference between the speed limit and the advisory speed) meet certain thresholds. A horizontal alignment sign and advisory speed plaque are recommended when the speed differential is 5 mph, and they are required if the speed differential is 10 mph or greater. Curve radius was used to estimate whether individual curves meet the speed differential requirements for advance warning signs and advisory speed plaques. The estimated advisory speeds (assuming a 55-mph speed limit, 6-percent superelevation, and friction factor that are consistent with the AASHTO Green Book) based on the curve radius are as follows:

- 900 to 1,100 feet – 50 mph
- 700 to 900 feet – 45 mph
- 500 to 700 feet – 40 mph
- 300 to 500 feet – 35 mph
- Under 300 feet – 30 mph or slower

For this analysis, no suggested advisory speed is provided for curves with a radius under 300 feet; these curves should be investigated further by the county to determine the appropriate advisory speed. Additionally, it is recommended that the county complete its own ball-bank indicator assessment of all curves to determine whether the curves on their road system meet the MUTCD requirement and to verify suggested advisory speeds.

If a curve was not selected as a project candidate through the LRSP risk assessment process (although the curve has an ADT greater than 1,000 vehicles per day and a radius under 1,100 feet), the curve was flagged for the county to determine the need for additional signs based on MUTCD guidance.

2.3.3 Rural Intersections – Crashes at Thru-STOP Intersections

At western region rural intersections, a severe crash is most common at Thru-STOP intersections,[1] where 91 percent of severe intersection crashes (51 of 56 severe crashes) occurred from 2009 to 2013 (Figure 2-10). Severe right-angle and single vehicle crashes are the most common types of crashes at these intersections (Figure 2-11).

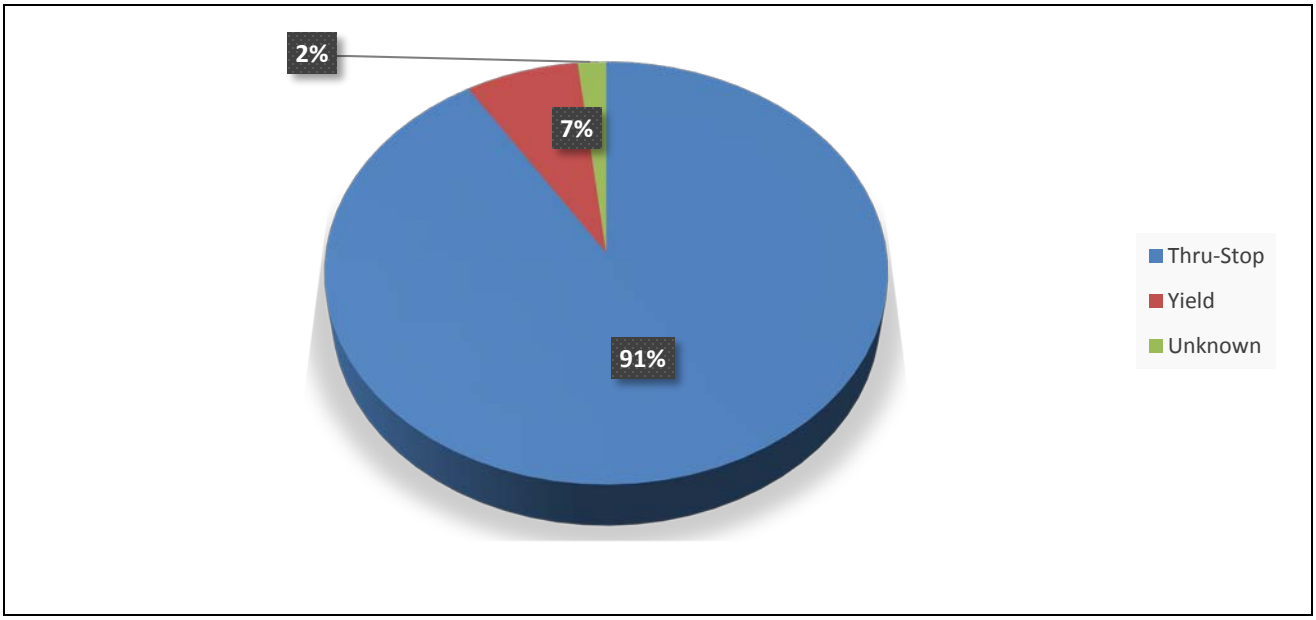


FIGURE 2-10
Phase 3 Rural Severe Crashes by Traffic Control Device (2009 to 2013)

[1] Those intersections where traffic on the more heavily used road may proceed through the intersection without stopping, while traffic on the less-used crossroad must stop at the STOP sign before proceeding through the intersection.

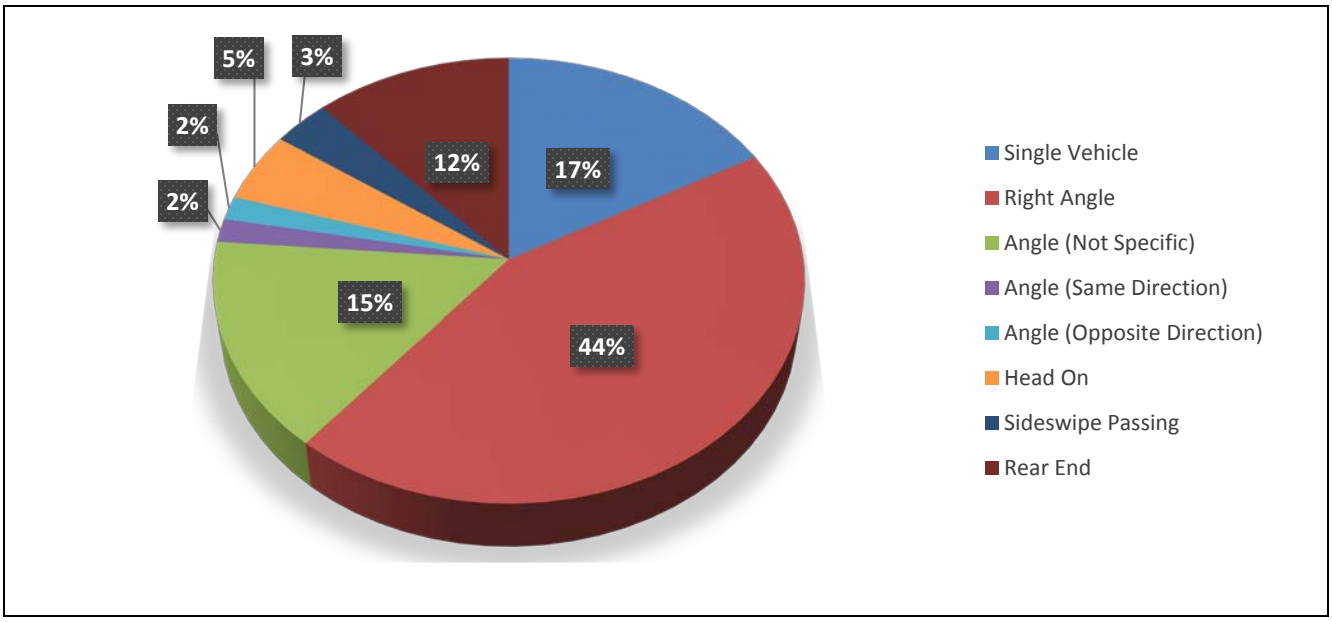


FIGURE 2-11
Western Region Rural Intersection Severe Crashes by Crash Type (2009 to 2013)

In the western region, 584 rural intersections with 504 Thru-STOP locations were reviewed. The average severe crash density at rural Thru-STOP locations is 0.01 severe crash per intersection per year. This low density supports assessing an intersection risk based on the characteristics of the locations where severe crashes occurred. The following seven rural Thru-STOP risk factors were identified for severe right-angle crashes:

1. **ADT Cross Product –** 83 percent of the severe right angle crashes at rural Thru-STOP intersections occurred at intersections with an ADT Cross Product[2] of major and minor entering vehicles greater than 80,000 (Figure 2-12). An intersection was considered to have a higher risk of severe right angle crashes if the ADT Cross Product was greater than 80,000. These intersections received a star.
2. **Skew –** As the intersection skew (the angle at which one road intersects another) increases, the crash risk also increases (Figure 2-13). At a 20-degree skew, the crash risk compared to that of a 90-degree intersection is increased by approximately 10 percent. While the region's severe right-angle crash data set was too small to determine if skew plays a role in crashes, it has been proven nationally that the greater the skew, the greater the likelihood for a crash (Figure 2-14). Intersections with a skew greater than 20 degrees received a star.
3. **Within or Near a Curve –** Research has shown that intersections located within or near a horizontal curve are subject to a higher level of risk. This risk factor was supported by the analysis (Figure 2-14). In this analysis, intersections located within or near a horizontal curve received a star.
4. **Development Present –** Research has shown that intersections with commercial development in one or more quadrants have a higher level of risk, possibly due to vehicles entering or exiting the development. Private residences or farms were not included as

[2] The ADT Cross Product is the major-street entering volume multiplied by the minor-street entering volume.

development. Intersections with development present had more severe crash rates (Figure 2-14) and therefore received a star.

5. **Railroad Crossing –** Intersections on or near a railroad crossing are subject to increased risk because drivers must navigate the railroad tracks while approaching the intersection. The rural analysis supported this risk factor (Figure 2-14). An intersection with a railroad crossing on one of the approaches received a star.
6. **Previous STOP More than 1 Mile Before the Intersection –** When traveling longer distances without encountering a STOP sign, drivers lose attention, and research has shown those intersections to be at higher risk (Figure 2-14). National data were used to confirm this risk factor. Intersections at which either of the stopped approaches do not enocounter a STOP sign within 1 mile received a star.
7. **Total Crashes –** If an intersection had any type of crash from 2009 to 2013, the intersection received a star.

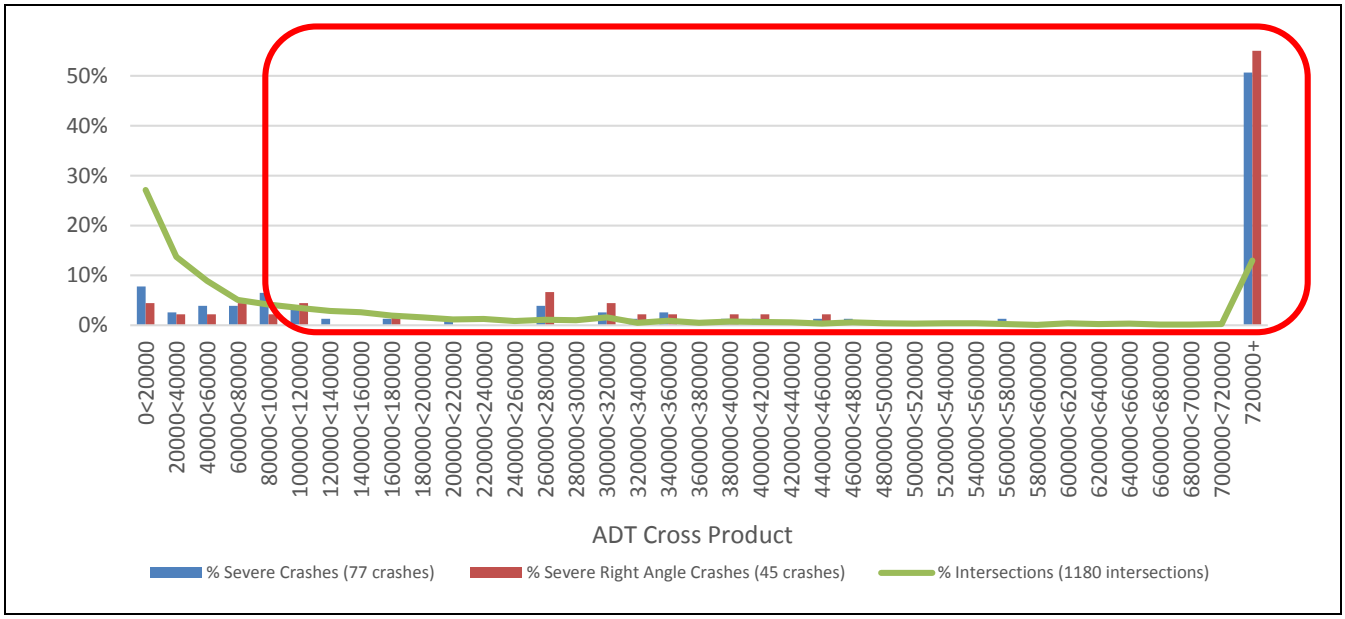
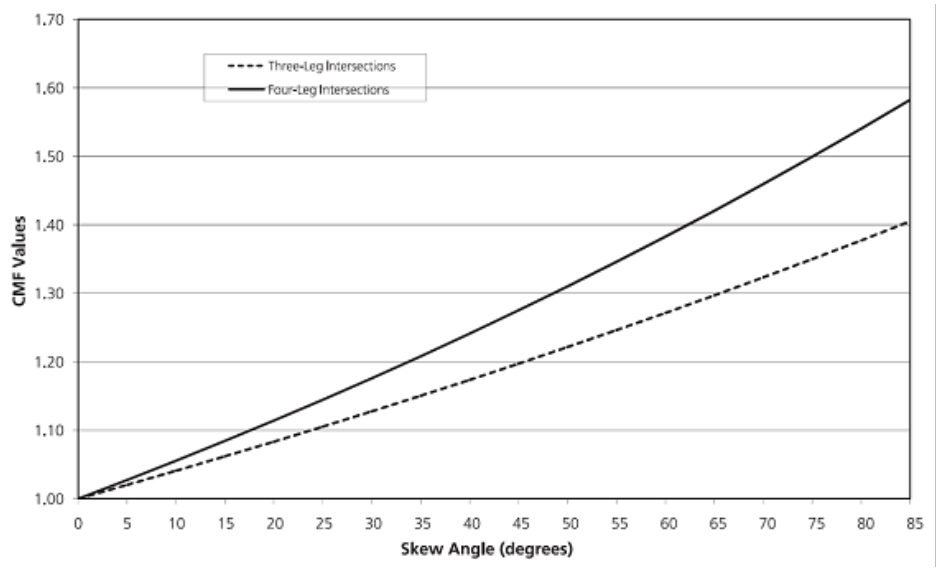


FIGURE 2-12
Rural ADT Cross Product for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)



Source: *Highway Safety Manual*, Volume III (Figure 14-6)

FIGURE 2-13
Intersection Skew Risk

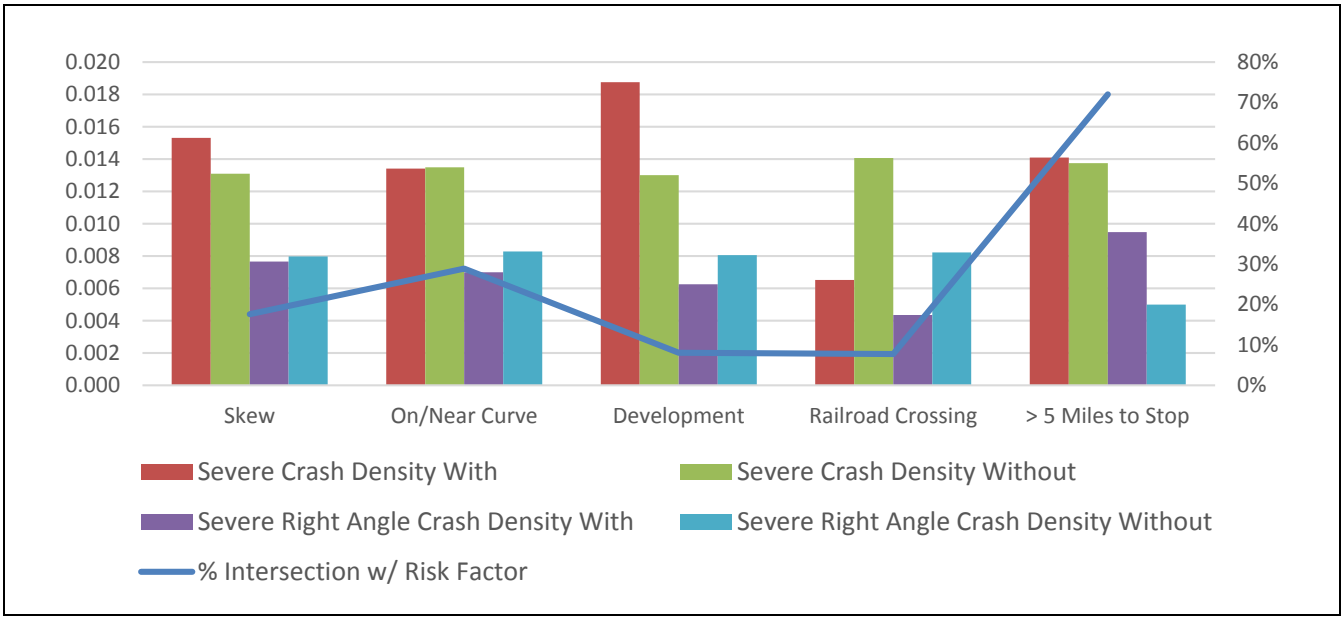


FIGURE 2-14
Rural Intersection Risk Factors for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

The western region had 584 total rural intersection crashes from 2009 to 2013, and only 56 of those crashes were severe. Due to the small number of severe crashes, some of the data and risk factors may be misleading based on the county data alone. National data were used to confirm intersection risk factors.

Detailed intersection analyses and results for the counties and cities are provided in Chapter 4. Due to the large number of intersections, each intersection was prioritized using the seven risk factors by giving stars to each risk factor present. The highest-priority intersections received the most stars. In cases where two or more intersections received the same number of stars, crash costs were used to break the tie and determine priority.

2.3.4 Urban Roadway Segments – Cities with Populations Greater than 5,000 (Cities of Dickinson and Williston)

Approximately 120 miles of urban local roads were reviewed, where 2,195 total and 36 severe crashes occurred from 2009 to 2013. Nationally, research has shown that rear-end and head-on crashes are most common on urban local roads. In the cities of Dickinson and Williston, 1,151 rear-end crashes and 203 head-on and sideswipe-opposing crashes occurred from 2009 to 2013.

Although a variety of data was collected for each local roadway segment, only the following four risk factors were identified for the cities of Dickinson and Williston:

1. **Average Daily Traffic (ADT) –** Both rear-end and head-on crashes were overrepresented in road corridors with ADT volumes greater than 5,000 vehicles per day (Figure 2-15). Corridors with an ADT greater than 5,000 vehicles per day received a star.
2. **Access Density –** Rear-end and head-on crashes are overrepresented along corridors with access densities greater than or equal to 30 access points per mile (Figure 2-16), and therefore received a star.
3. **Road Geometry –** Crashes are overrepresented per corridor mile on roadways with four or more lanes (Figure 2-17), and therefore multilane roadways were given a star.
4. **Speed Limit –** Severe rear-end and head-on crashes were overrepresented in low-speed corridors (between 30 and 40 mph) (Figure 2-18), and therefore received a star.

Detailed urban segment analyses and results for Dickinson and Williston are provided in Chapter 4. The four risk factors were used to prioritize roadway segments, with the highest priority segments receiving the most stars. High-priority roadway segments were also reviewed from a corridor perspective so that suggested safety improvement projects create a consistent corridor throughout the urban area.

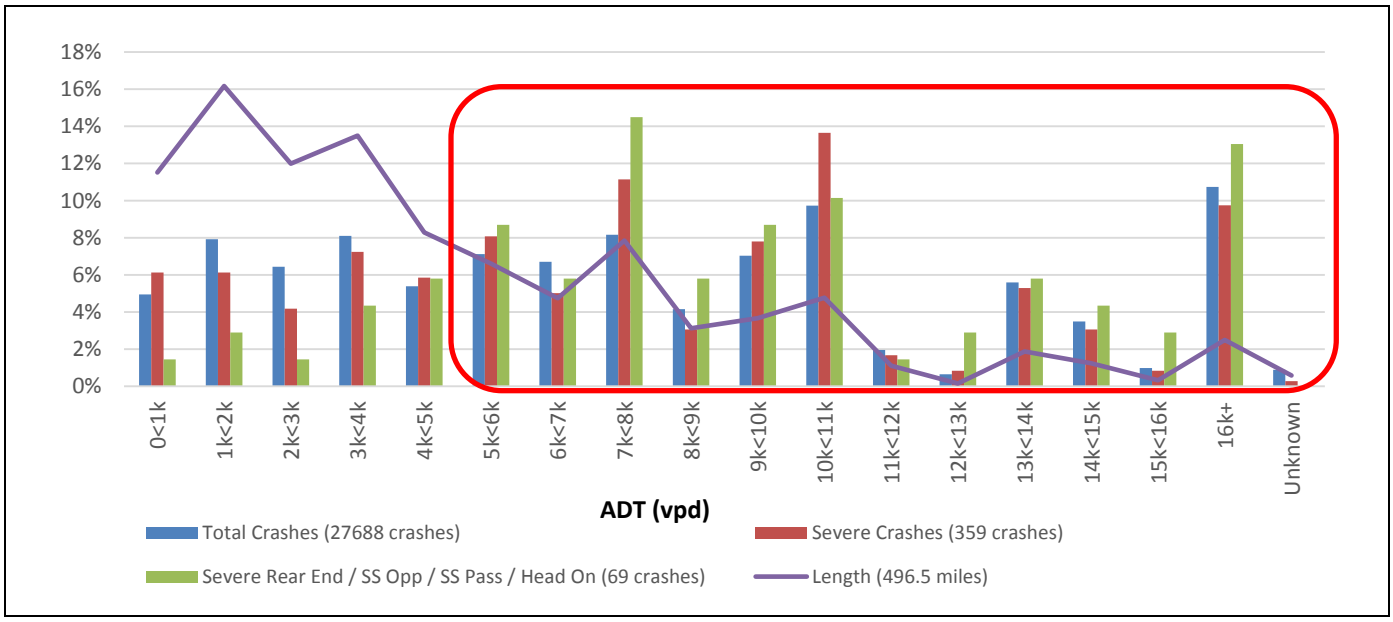


FIGURE 2-15
Urban Roadway Segment Average Daily Traffic (ADT) for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

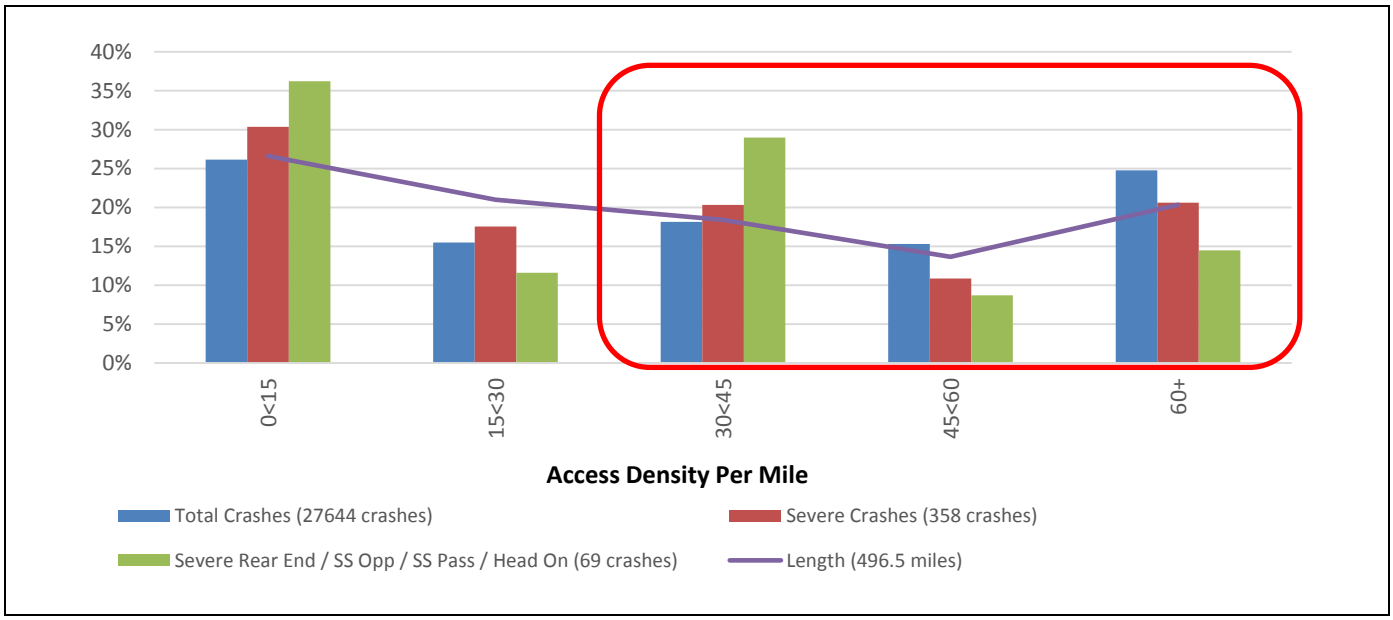


FIGURE 2-16
Urban Roadway Segment Access Density for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

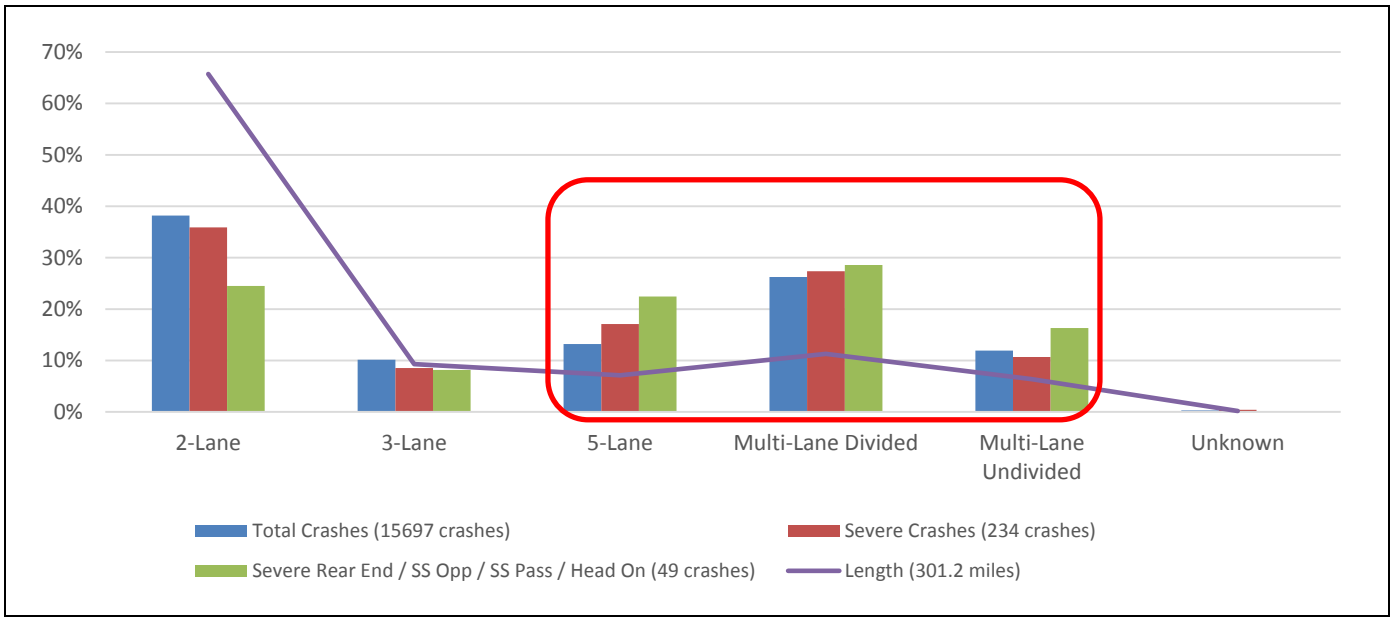


FIGURE 2-17
Urban Road Geometry for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

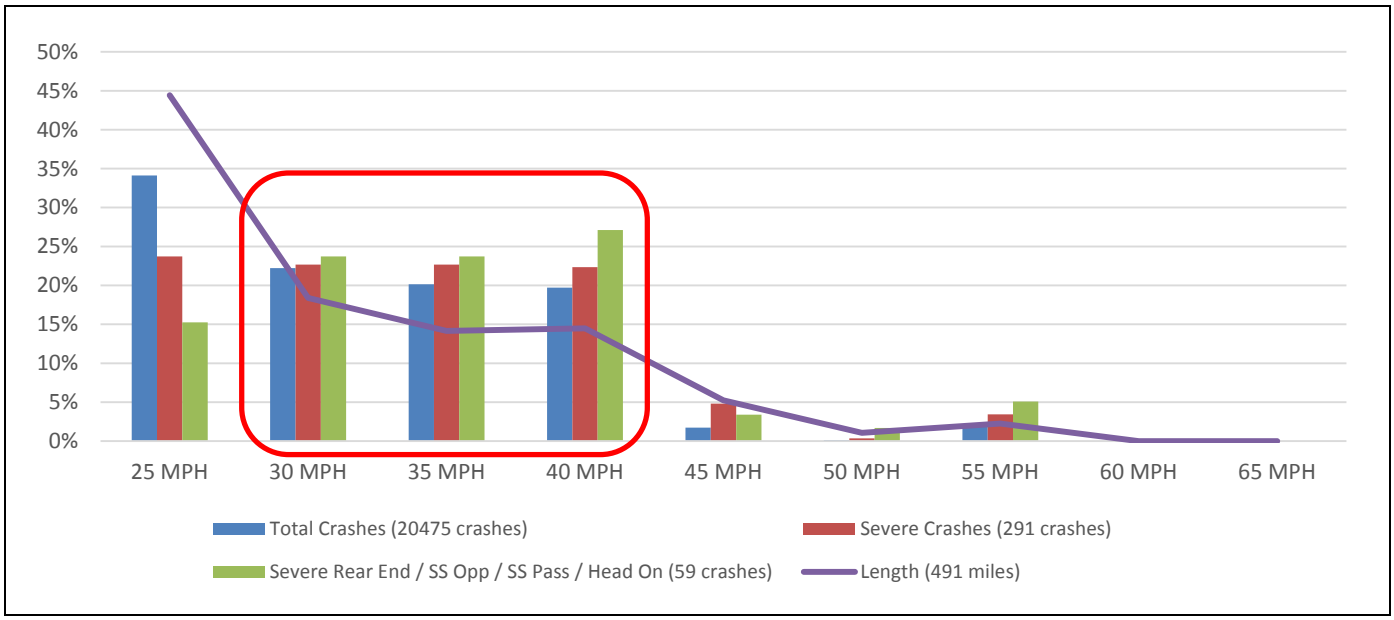


FIGURE 2-18
Urban Roadway Segment Crashes by Speed for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

2.3.5 Urban Intersections – Right-Angle Crashes, Cities with Populations Greater than 5,000 (Cities of Williston and Dickinson)

In the cities of Dickinson and Williston, 232 intersections, including 25 signalized intersections, were analyzed. Of the over 2,195 total crashes, only 36 severe crashes occurred at the Dickinson and Williston urban intersections that were analyzed. This data supports assessing an intersection's risk based on the characteristics of those locations with severe crashes. From the variety of information collected for each intersection, the following six risk factors for right angle crashes were chosen:

1. **Traffic Control Device –** Severe crashes are overrepresented at signalized intersections versus other intersection control types in urban areas (Figure 2-19). Therefore, signalized intersections received a star.
2. **Entering ADT –** Higher volumes of vehicles entering intersections was considered a risk factor. Approximately 35 percent of right angle crashes at signalized intersections in the urban areas for all phases occurred at intersections with an entering ADT greater than 17,500 vehicles per day (Figure 2-20). Therefore, any intersection with an entering ADT greater than 17,500 vehicles per day received a star.
3. **Road Geometry –** Severe and right-angle crashes were overrepresented on divided roadways with signalized intersections (Figure 2-21). Therefore, intersections on divided roadways received a star.
4. **Major Corridor Speed Limit –** Low-speed corridors were found to act as a surrogate for severe angle crashes (Figure 2-21). Therefore, intersections with speed limits between 30 and 50 mph received a star.
5. **Total Lanes on Major Approach –** Severe and severe angle crashes were overrepresented at intersections containing five or more approach lanes (Figure 2-22). Therefore, intersections with five or more approach lanes received a star.
6. **Severe Crashes –** Any intersection where one or more severe crashes had occurred received a star.

Detailed urban intersection right angle analyses and results for the cities of Dickinson and Williston are in Chapter 4. The risk factors previously listed were used to help prioritize intersections with the highest-priority intersections receiving the most stars. Right angle crash intersections were reviewed as urban corridors to create a consistent corridor throughout the urban area and to discourage implementing strategies at just one or two high-priority intersections along a corridor if the remaining intersections have the same characteristics.

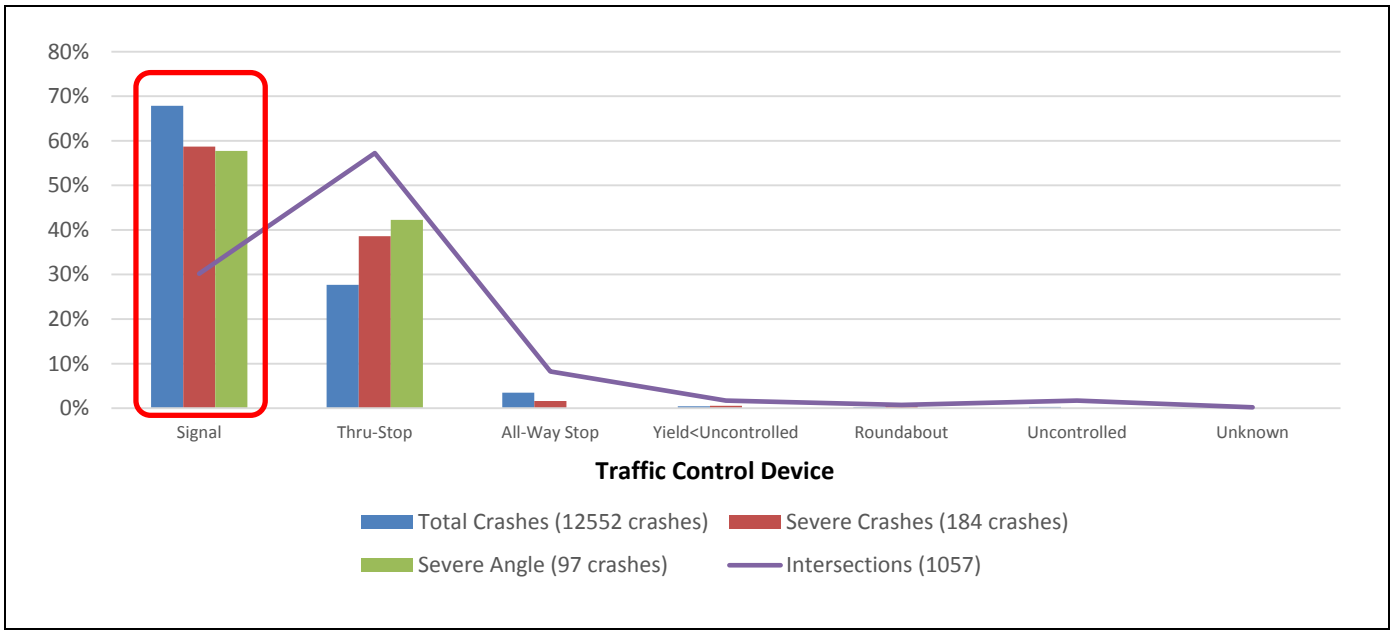


FIGURE 2-19
Urban Crashes by Intersection Traffic Control Device for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

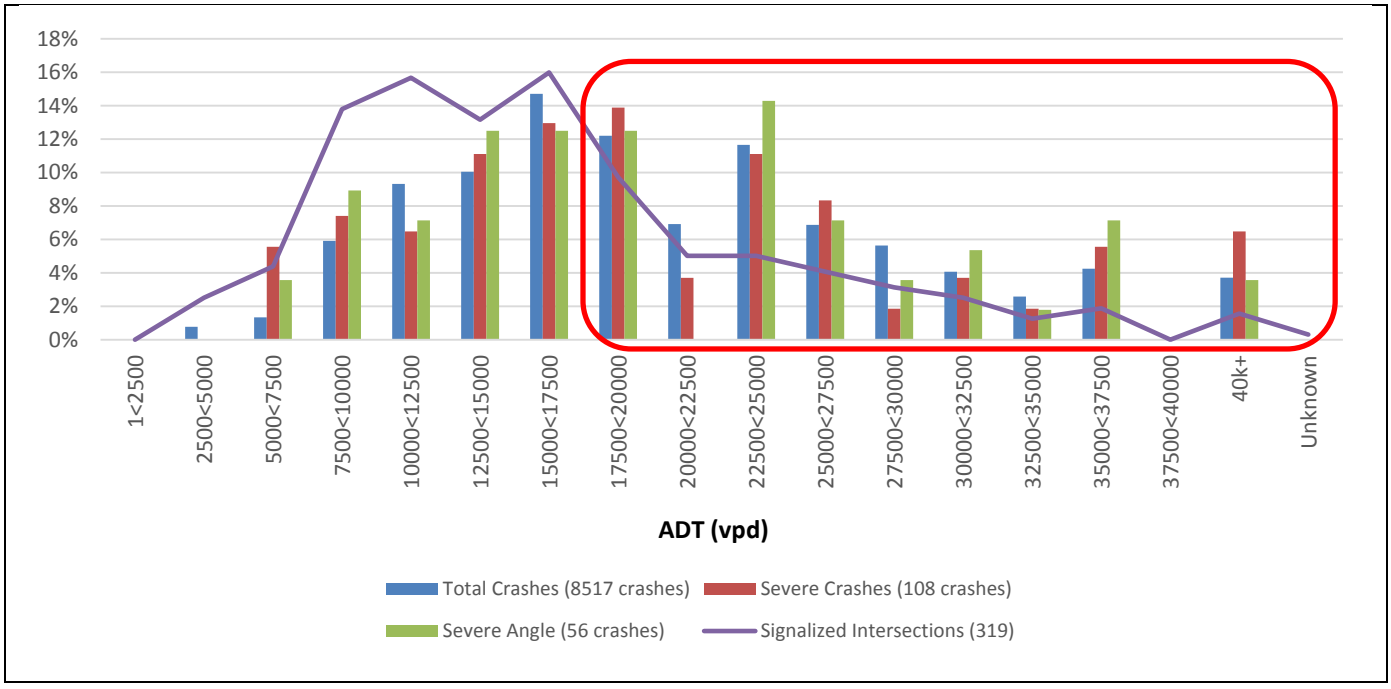


FIGURE 2-20
Urban Crashes by Intersection Entering Vehicles Average Daily Traffic (ADT) for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

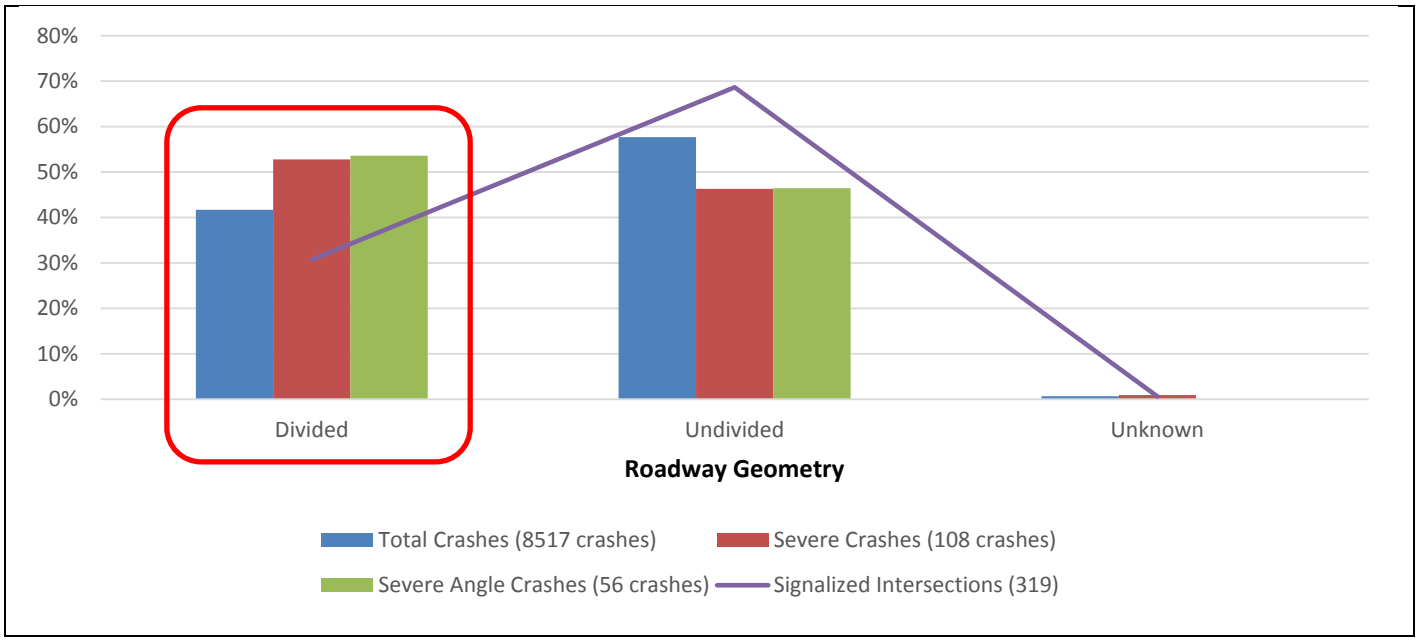


FIGURE 2-21
Urban Crashes by Road Geometry at Intersections for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

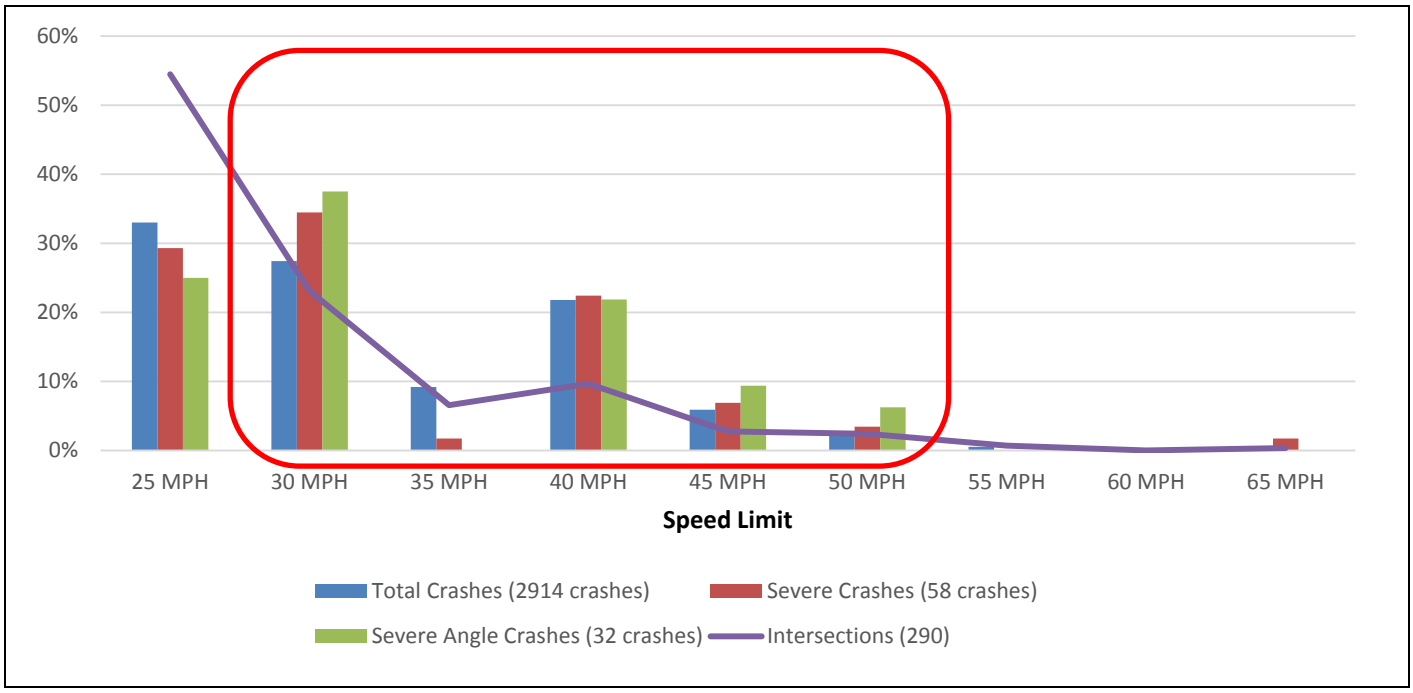


FIGURE 2-22
Urban Crashes by Intersection Approach Speed Limit for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

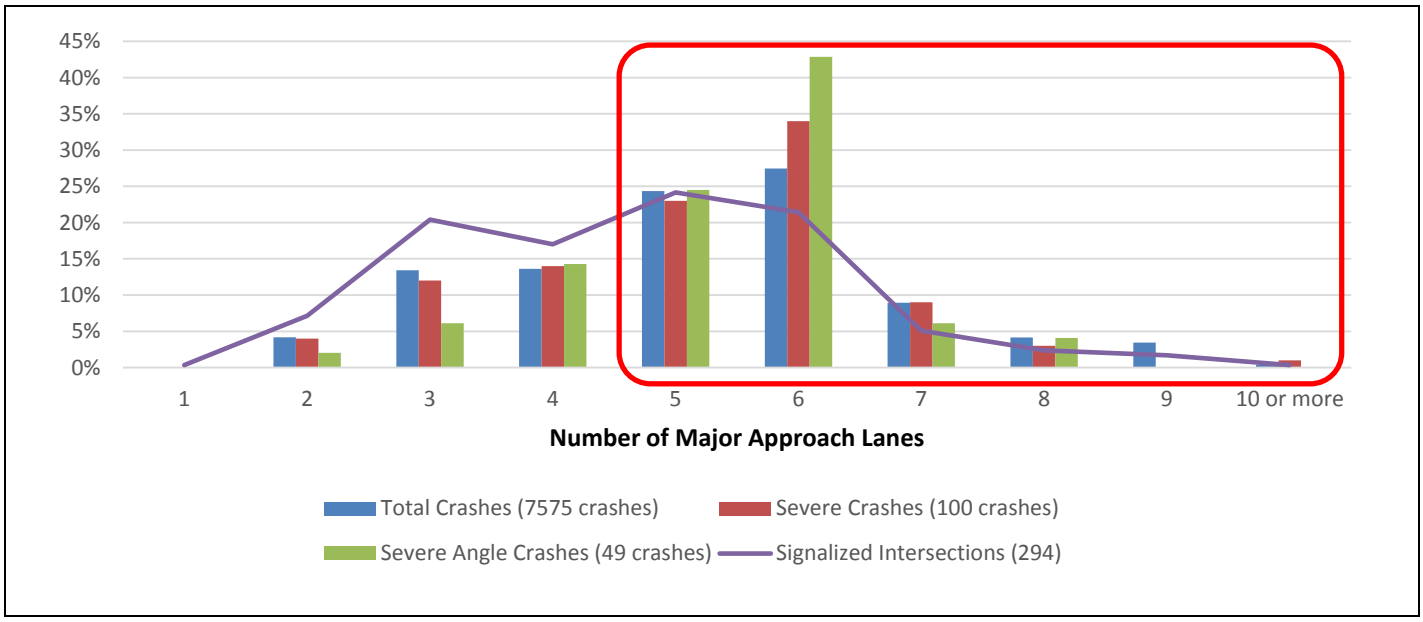


FIGURE 2-23
Urban Signalized Intersection Crashes by Major Approach Lanes Distribution for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

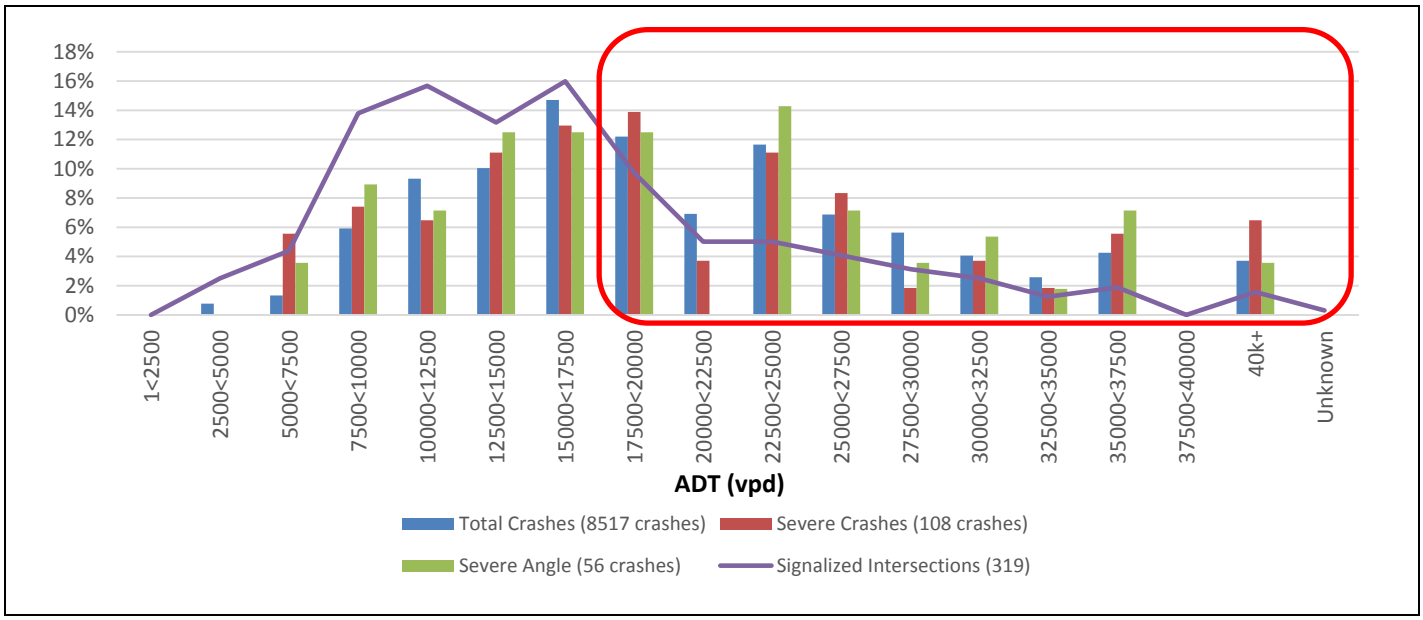


FIGURE 2-24
Urban Crashes by Intersection Entering Vehicles Average Daily Traffic (ADT) for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

2.3.6 Urban Intersections – Pedestrian/Bicycle Crashes, Cities with Populations Greater than 5,000 (Cities of Dickinson and Williston)

A similar analysis was completed for pedestrian and bicycle crashes at intersections. A total of 36 severe pedestrian and bicycle crashes occurred at urban North Dakota intersections studied during the first three phases. The following six risk factors were identified based on the analysis:

1. **Traffic Control Device -** Severe pedestrian and bicycle crashes are overrepresented at signalized intersections versus other intersection control types in urban areas (Figure 2-23). Therefore, signalized intersections received a star.
2. **Entering Vehicles ADT –** A high volume of vehicles entering an intersection was considered a risk factor. A majority of the severe pedestrian and bicycle crashes occurred at intersections with an entering vehicles ADT greater than 15,000 vehicles per day (Figure 2-24). Therefore, any intersection with an entering vehicles ADT greater than 15,000 vehicles per day or greater received a star.
3. **Pedestrian Generator –** Intersections with adjacent land uses likely to generate pedestrian traffic (such as a school, playground, bar, or gas station) had a higher pedestrian and bicycle crash risk than other intersections (Figure 2-25). Therefore, an intersection with a pedestrian generator present received a star.
4. **Major Corridor Speed Limit** – Low-speed corridors were found to act as a surrogate for severe pedestrian and bicyclist crashes (Figure 2-26). Therefore, intersections with low speed limits (between 30 and 40 mph) received a star.
5. **Total Lanes on Major Approach** – Pedestrian and bicycle crashes were overrepresented at intersections containing between two and five approach lanes (Figure 2-27). Therefore, intersections with between two and five approach lanes received a star.
6. **Pedestrian and Bicycle Crashes –** Any intersections that had any bicycle or pedestrian crash from 2009 to 2013 received a star.

Detailed urban intersection pedestrian and bicycle analysis and results for the cities of Dickinson and Williston are provided in Chapter 4. The six risk factors were used to prioritize intersections with the highest-priority intersections receiving the most stars. Pedestrian and bicycle crash intersections were reviewed as urban corridors to create a consistent corridor throughout the urban area.

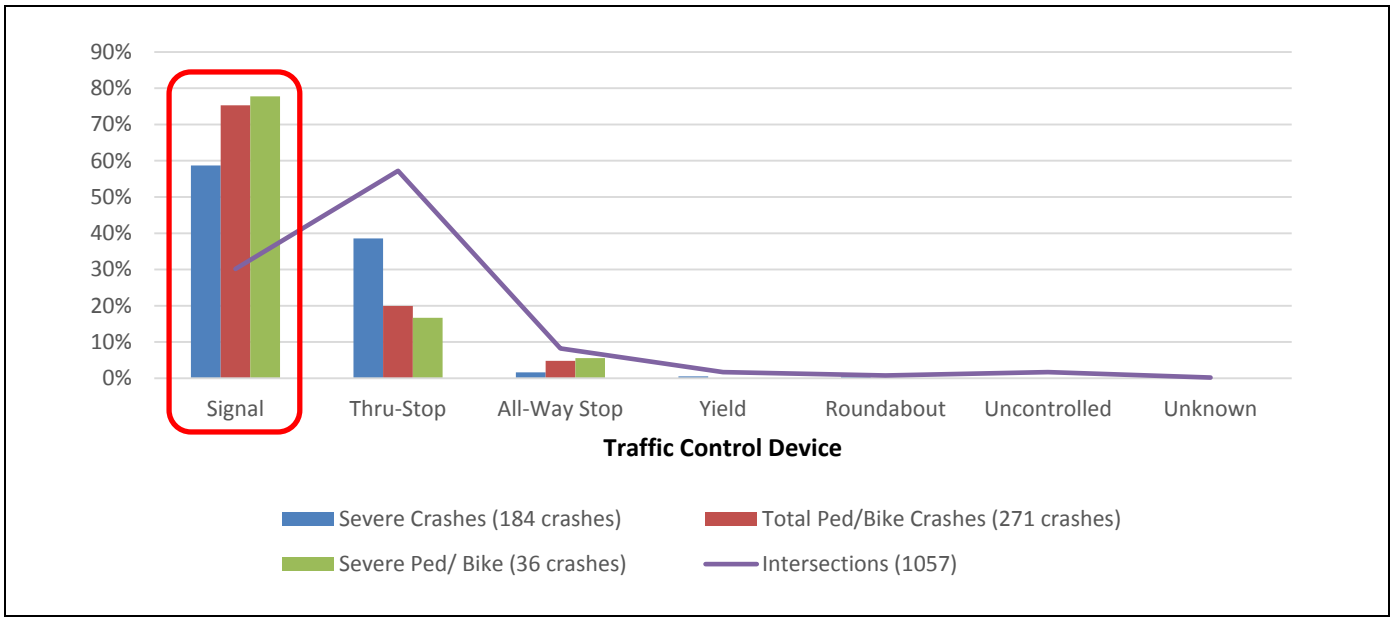


FIGURE 2-25
Urban Pedestrian/Bicycle Crashes by Intersection Traffic Control Devices for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

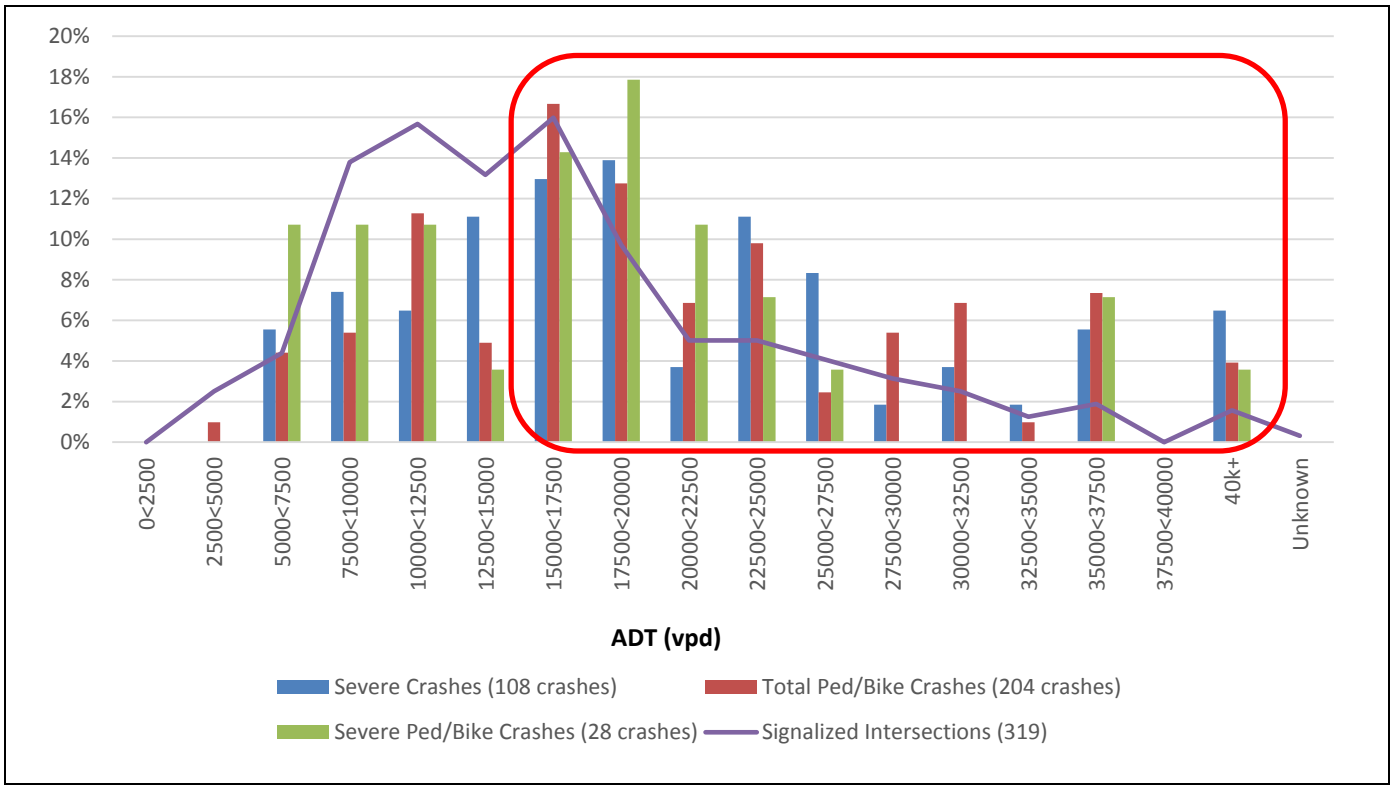


FIGURE 2-26
Urban Pedestrian/Bicycle Crashes by Average Daily Traffic (ADT) for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

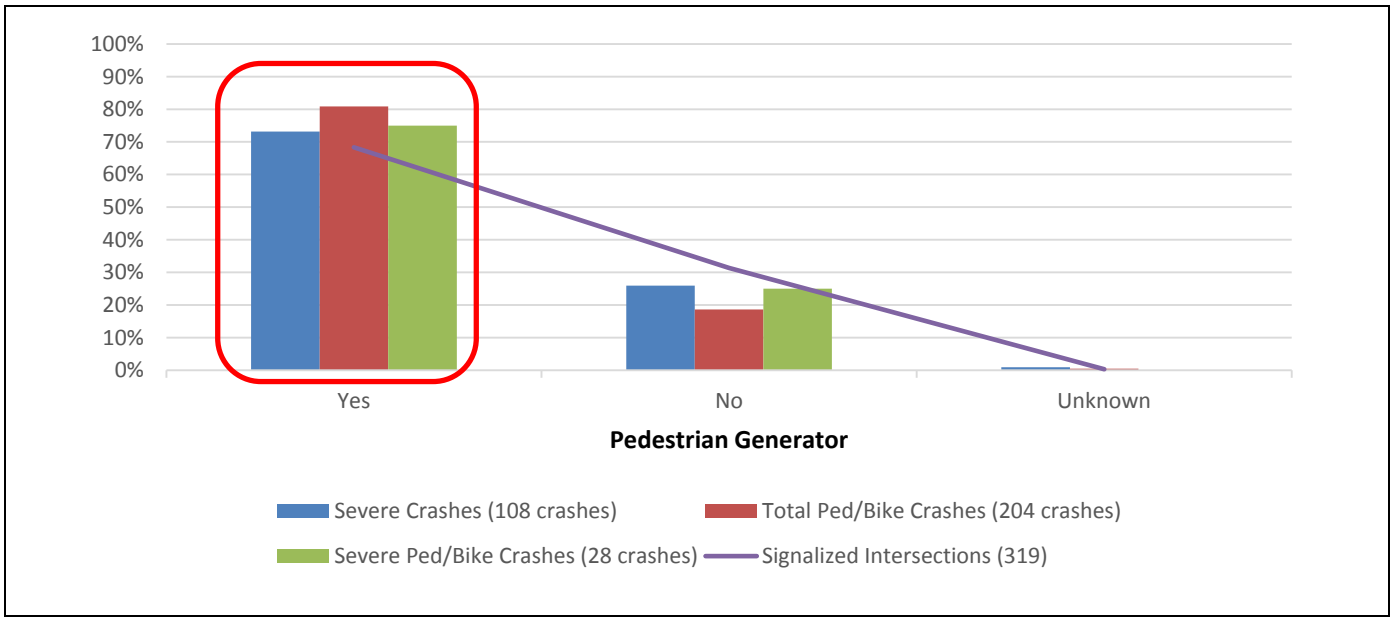


FIGURE 2-27
Pedestrian/Bicycle Crashes at Urban Intersection with a Pedestrian Generator for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

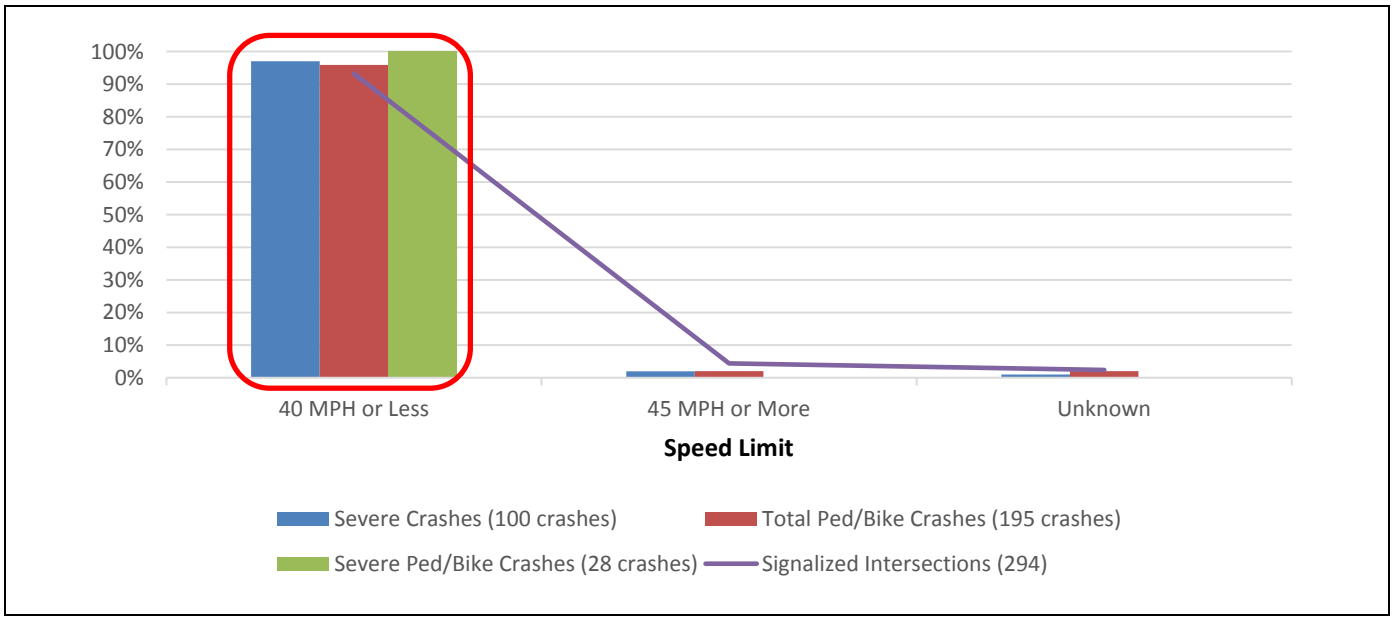


FIGURE 2-28
Urban Pedestrian/Bicycle Crashes by Speed Limit for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

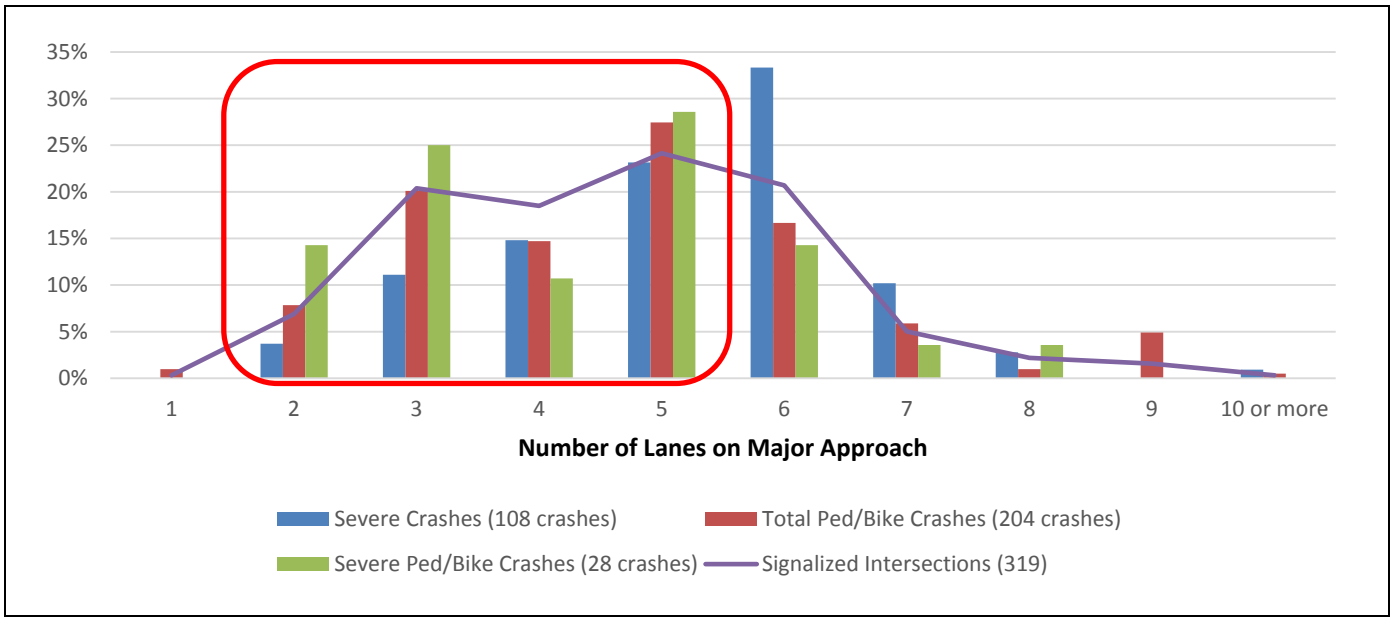


FIGURE 2-29
Urban Pedestrian/Bicycle Crashes by Number of Lanes on the Major Approach Lanes for All Phases
Source: NDDOT Crash Reporting System, 2008-2012 (Phase 1 and Phase 2), 2009-2013 (Phase 3)

2.4 Western Region Risk Summary

Table 2-3 summarizes the risk factors, ranges, and sources used in the western region's systemic analysis.

TABLE 2-3
Western Region Risk Summary

Risk Factors	Western Region		
	Minimum	Maximum	Source
Rural Roadway Segments			
ADT Range	450	Unlimited	All Rural Phases 1 through 3
Access Density	6	Unlimited	All Rural Phases 1 through 3
Lane Departure Density	0.065	Unlimited	All Rural Phases 1 through 3
Curve Critical Radius Density	0.253	Unlimited	Rural Phase 3
ERA	2	3	All Rural Phases 1 through 3
Rural Curves			
Radius	500	1,200	National
ADT Range	450	Unlimited	All Rural Phases 1 through 3
Intersection on Curve	Present		All Rural Phases 1 through 3
Visual Trap	Present		All Rural Phases 1 through 3
Severe Crashes	1	Unlimited	All Rural Phases 1 through 3

TABLE 2-3
Western Region Risk Summary

Risk Factors	Western Region		
	Minimum	Maximum	Source
Rural Intersections			
ADT Cross Product	80,000	Unlimited	All Rural Phases 1 through 3
Skew	Present		All Rural Phases 1 through 3
On/Near Curve	Present		All Rural Phases 1 through 3
Development	Present		All Rural Phases 1 through 3
Railroad Crossing	Present		National
Previous STOP >5 Miles	Present		All Rural Phases 1 through 3
Total Crashes	1	Unlimited	All Rural Phases 1 through 3
Urban Roadway Segments			
ADT	5,000	Unlimited	All Urban Phases 1 through 3
Road Geometry	Multilane (4+)		All Urban Phases 1 through 3
Access Density	30	Unlimited	All Urban Phases 1 through 3
Corridor Speeds	30	40	All Urban Phases 1 through 3
Urban Right-Angle Crash Corridors			
Entering ADT	17,500	Unlimited	All Urban Phases 1 through 3
Traffic Control	Signal		All Urban Phases 1 through 3
Major Corridor Speeds	30	50	All Urban Phases 1 through 3
Road Geometry	Divided		All Urban Phases 1 through 3
Total Lanes on Major Approach	≥5 Approach Lanes		All Urban Phases 1 through 3
Severe Crashes	1	Unlimited	All Urban Phases 1 through 3
Urban Pedestrian and Bicycle Crash Corridors			
Traffic Control	Signal		All Urban Phases 1 through 3
Entering ADT	15,000	Unlimited	All Urban Phases 1 through 3
Major Corridor Speeds	30	40	All Urban Phases 1 through 3
Pedestrian Generator	Yes		All Urban Phases 1 through 3
Total Lanes on Major Approach	2	5	All Urban Phases 1 through 3
Pedestrian/Bicycle Crashes	1	Unlimited	All Urban Phases 1 through 3

Notes:
ADT = average daily traffic
ERA = edge risk assessment

3.0 Western Region Priority Safety Strategies

3.1 Background

A variety of strategies are available to address each safety emphasis area. The implementation of high-priority strategies will assist state and local agencies in reducing traffic-related fatalities and incapacitating injuries. The primary sources for these strategies are the National Cooperative Highway Research Program (NCHRP) *Report 500* series and the National Highway Traffic Safety Administration (NHTSA) *Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices*, (Seventh Edition, 2013). Each guide includes a description of the issue, strategies, and model implementation processes. In addition, to assist practitioners in assessing the safety strategies, the guides document the expected effectiveness of each strategy. NCHRP *Report 500* series assigns strategies to one of the following categories:

- **Proven:** These strategies have been used in multiple locations with multiple studies, and have been demonstrated to be effective.
- **Tried:** These strategies have been implemented in many locations; however, no rigorous evaluations have been completed to determine their effectiveness.
- **Experimental:** These strategies represent ideas that are considered to be effective; however, the ideas have not been widely implemented or evaluated.

3.2 Initial/Comprehensive List of Potential Strategies

NCHRP safety strategies were the basis for identifying safety strategies for the LRSP. For the LRSP process, NDDOT team members sought to identify viable safety strategies for the top safety emphasis areas (see Tables 3-1 through 3-12). The LRSP team reviewed the full range of safety strategies, and did an initial screening based on cost and effectiveness. For example, the NCHRP report lists over 70 potential strategies to address intersection safety. The screening conducted by the LRSP team narrowed the list of strategies for all safety emphasis areas down to strategies considered to be the most applicable in North Dakota.

Behavioral strategies include information on the expected effectiveness of the strategy to influence driver behavior based on current best practice and evaluation research results when available.

Each infrastructure strategy includes information on the relative cost to implement or operate, along with the typical timeframe for implementation. Relative costs were separated into low, medium, and high categories.

The relative costs for the lane departure strategies are:

- Low = less than $10,000 per mile
- Medium = between $10,000 and $100,000 per mile
- High = more than $100,000 per mile

The relative costs for the intersection strategies are:

- Low = less than $100,000 per location
- Medium = between $100,000 and $500,000 per location
- High = more than $500,000 per location

The typical timeframe to implement the strategy was also separated into three categories:

- Short = less than 1 year to implement
- Medium = between 1 and 2 years to implement
- Long = more than 2 years to implement

TABLE 3-1
Impaired Driving Strategies (Behavioral Strategies)

Objectives	Strategies	Effectiveness	Programs and Tactics
A – Eliminate Drinking and Driving	**A1 –** Conduct alcohol screening and brief interventions	Proven	Implement health care provider interventions with crash victim after an alcohol-related crash (traumatic event) to screen for alcohol use problems, educate on risks of impaired driving, and treatment referral. Develop fact sheets and materials to be used.
	A2 – Support community programs for alternative transportation	Proven	Employ "Safe Cab" initiatives via partnership among beer distributors, bar owners and/or county/city community programs. Conduct public outreach on accessible safe-ride alternatives.
	A3 – Promote North Dakota "No Refusal" Law	Moderate	Educate high-risk populations/communities on North Dakota's new "No Refusal" law where consequences of DUI test refusal are greater than test failure.
	A4 – Promote North Dakota sobriety initiatives for DUI offenders	Proven	Promote 24/7, DUI courts, and ignition interlock programs through educating local judicial and legal counsel members, probation officers, counseling and treatment providers as well as the general public.
B – Enforce DWI Laws and Strengthen Adjudication of DUI Offenses	**B1 –** Expand use of high-visibility DUI enforcement saturations including sobriety checkpoints	Proven	Conduct multi-agency, multi-squad car enforcement efforts. Agencies work in collaboration to provide data-driven, high-visibility education/media outreach and enforcement for high-risk roadways.
	B2 – Educate and enforce zero tolerance laws for drivers under age 21	Tried	Conduct education and high-visibility enforcement through community events including local media and public outreach about underage drinking and driving.
	B3 – Strengthen DUI convictions and sentencing through justice system evaluation and outreach	Tried	Assess local DUI prosecution and sentencing data to determine DUI plea bargain and conviction rates, as well as a comparative analysis with other North Dakota district courts. Conduct outreach with judicial personnel (prosecutors and judges) where data indicates higher DUI dismissal or plea bargain rates.
	B4 – Strengthen alcohol compliance of liquor-providing establishments	Tried	Advocate for responsible alcohol server and retailer training and compliance checks. Promote judicial monitoring of "last place of drink" for bar-related DUI offenders and notify establishments of their over-serving.

TABLE 3-2
Seat Belt Use Strategies (Behavioral Strategies)

Objectives	Strategies	Effectiveness	Programs and Tactics
A – Publicize and Enforce Seat Belt Use Laws	**A1 –** Conduct high-visibility enforcement to maximize restraint use	Proven	Conduct a multi-agency, multi-squad car enforcement effort. Agencies work in collaboration to provide data-driven, saturated, high-visibility enforcement coupled with media outreach targeted toward high-risk populations. Conduct enhanced enforcement on North Dakota's secondary roads. Incorporate enhanced nighttime enforcement including multi-agency (when possible) and multiple squad cars in well-lit areas where slow moving vehicles are passing and conducting seat belt observations for a limited time.
	A2 – Enforce North Dakota's secondary belt use law	Proven	Reinforce officers issuing second belt use ticket during traffic stops.
	A3 – Pursue tribal ordinances for primary enforcement of seat belt law	Proven	Under tribal ordinance, pursue primary seat belt enforcement for occupants in all seating positions.
B – Maximize Use of Occupant Restraints by All Vehicle Occupants	**B1** -- Encourage employer traffic safety programs and policies	Tried	Encourage employers to offer traffic safety education programs to employees and to enact traffic safety policies with clear consequences for failure to comply.
	B2 – Conduct brief intervention regarding unbelted risks	Experimental	Health care provider conducts brief intervention with crash victim after an unbelted crash (traumatic event) on unbelted risks and consequences.
	B3 -- Provide insurance incentives	Experimental	Promote local insurance provider incentives (for example, reduced premium rates) for safe driving practices including belt use at the time of traffic crash.

TABLE 3-3
Speed and Aggressive Driving Strategies (Behavioral Strategies)

Objectives	Strategies	Effectiveness	Programs and Tactics
A – Deter Aggressive Driving for High-risk Populations and Locations	**A1 –** Identify high-risk speed locations/corridors for enforcement.	Proven	Strengthen crash data analysis to define high-risk speed/aggressive driving locations (including intersections) for enhanced enforcement and public outreach efforts.
	A2 – Conduct high-visibility enforcement of speeding and aggressive driving	Proven	Conduct a multi-agency, multi-squad car enforcement effort. Agencies work in collaboration to provide data-driven, saturated, high-visibility enforcement at high-risk speed/aggressive driving roadways and intersections coupled with media outreach to high-risk populations.
	A3 – Pursue local/tribal use of automated enforcement in high-risk areas	Proven	Pursue the use of automated enforcement in high-risk highway work zones and school crossing zones through the use of local/tribal safety ordinances.
B – Maximize Driver Compliance and Awareness	**B1 –** Conduct brief interventions for speed-related injuries	Tried	Implement health care provider brief interventions with crash victims after crash (traumatic event) due to excessive speed on speed risks and consequences.
	B2 – Increase driver awareness of speed using speed reader boards	Proven	Expand use of speed reader boards providing feedback to drivers on their actual speed (e.g., flash warnings when speeds exceeds limit). Most effective in slowing traffic on residential streets, near school zones, and around playgrounds.

TABLE 3-4
Young Driver Strategies (Behavioral Strategies)

Objectives	Strategies	Effectiveness	Programs and Tactics
A – Publicize, and Enforce Laws Pertaining to Young Drivers	**A1 –** Conduct high visibility enforcement of GDL, no cell and texting laws, underage drinking and driving, and seat belt use laws	Proven	Conduct enhanced enforcement and public outreach for young driver safety. Publicizing is best done through community events to attract local media and a community public education campaign about young driver laws, enhanced enforcement, and the necessary parental involvement.
B – Actively Engage Parents in Managing Teen Driving Skill Development	**B1 –** Encourage driver education providers (local schools and private providers) to require parent education component	Tried	Promote required parent education component of local driver education programs (private and public school providers) to educate parents about teen driving risks, Graduated Driving License (GDL) provisions and their protections, parental role in supervising teen driving skill development, encourage selection of safer vehicles for teen driver, and to facilitate parent/teen driving agreements.
	B2 – Promote use of in-vehicle teen safety technology	Experimental	To help reduce and eliminate teen driving distractions and high-risk driving maneuvers (excessive speed, hard acceleration, deceleration, and swerves) promote the use of in-vehicle monitoring devices for parental monitoring and coaching.
	B3 – Promote safe teen driving outreach	Tried	Encourage driver education, local insurance, and public health organizations to provide teens and their parents with brochures, guides, and web resources to help parents understand risks, GDL provisions, their role, and how to develop a Parent/Teen Driving Agreement, and online driving logs.
	B4 – Provide information on insurance provider parent-teen safe driving programs	Tried	Inform parents of local insurance programs providing policy discounts for parents and their teen enrolling in parent-teen safe driving programs.
C – Promote Young Driver Awareness of Risks	**C1 –** Brief interventions regarding driving risks and consequences	Experimental	When teen driver receives a moving violation or is involved in a crash, health care provider conducts brief intervention with crash victim after crash (traumatic event) on driving risks and consequences
	C2 – Conduct peer-to-peer safety outreach	Moderate	Promote peer education of traffic safety through peer-to-peer outreach campaigns and contests to engage teens on teen driving risks and socially reinforced safe driving behaviors.

TABLE 3-5
Cross-Cutting Safety Strategy (Behavioral Strategy)

Objectives	Strategies	Effectiveness	Programs and Tactics
A – Improved Quality and Timeliness of Crash Data	**A1 –** Local and tribal enforcement use of Traffic and Criminal Software (TraCS)	Proven	Promote local and tribal enforcement full deployment of TraCS for in-the-field incident reporting and electronic submission of crash reports to the NDDOT.

TABLE 3-6
Speeding Strategies (Infrastructure Strategies)

Objectives	Strategies	Effectiveness	Cost to Implement and Operate[1]	Timeframe for Implementation[2]
A – Set Appropriate Speed Limits	**A1 –** Install speed signage using variable message signs in school zones	Tried	Low	Medium
B – Communicate Appropriate Speeds through Use of Traffic Control Devices	**B1 –** Implement dynamic speed feedback signs, including dynamic message boards at rural to urban transitions	Tried	Low	Medium
	B2 – Use in-pavement measures to communicate the need to reduce speeds	Tried	Moderate	Short
C – Ensure that Roadway Supports Appropriate and Safe Speeds	**C1 –** Effect safe speed transitions through design elements and on approaches to lower-speed areas	Tried	High	Long

Notes:
[1] Cost: Low = <$100,000 per intersection; Moderate = $100,000 to $500,000 per intersection; High = >$500,000 per intersection
[2] Implementation: Short = <1 year; Medium = 1 to 2 years; Long = >2 years
Source: NCHRP *Report 500* Series, 2004

TABLE 3-7
Lane Departure Strategies (Infrastructure Strategies)

Objectives	Strategies	Effectiveness	Cost to Implement and Operate[1]	Timeframe for Implementation[2]
A – Keep Vehicles from Encroaching on the Roadside	**A1 –** Install edge rumble strips (shoulder or edge line)	Proven	Low	Short
	A2 – Install enhanced pavement markings, 6-inch edge line, or embedded wet-reflective pavement markings on section with narrow or no paved shoulders	Experimental/ Tried	Low	Short
	A3 – Provide enhanced shoulders, lighting, delineation (for example, Chevrons), or pavement markings for sharp horizontal curves	Tried / Proven	Low	Short
	A4 – Provide skid-resistance pavement surfaces	Proven	Moderate	Medium
	A5 – Apply shoulder treatments *Eliminate shoulder drop-offs *Safety edge *Widen and/or pave shoulders	Experimental/ Proven	Moderate	Medium
B – Minimize the Likelihood of Crashing into an Object or Overturning if the Vehicle Travels Off the Shoulder	**B1 –** Design safer slopes and ditches to prevent rollovers	Proven	Moderate to High	Medium
	B2 – Remove/relocate objects in hazardous locations	Proven	Moderate to High	Medium
C – Reduce the Severity of the Crash	**C1 –** Improve design and application of barrier and attenuation systems	Tried	Moderate to High	Medium
D – Keep Vehicles from Encroaching into Opposite Lane	**D1 –** Install centerline rumble strips for two-lane roads	Tried	Low	Short
	D2 – Reallocate total two-lane roadway width (lane and shoulder) to include a “buffer median”	Tried	Low	Medium
E – Minimize the Likelihood of Crashing into an Oncoming Vehicle	**E1 –** Use alternating passing lanes or four-lane sections at key locations (Swedish "2+1")	Tried	Moderate to High	Medium

Notes:
[1] Cost: Low = <$10,000 per mile; Moderate = $10,000 to $100,000 per mile; High = >$100,000 per mile
[2] Implementation: Short = <1 year; Medium = 1 to 2 years; Long = >2 years
Source: NCHRP *Report 500* Series, 2003

TABLE 3-8
Signalized Intersection Strategies (Infrastructure Strategies)

Objectives	Strategies	Effectiveness	Cost to Implement and Operate[1]	Timeframe for Implementation[2]
A – Reduce Frequency and Severity of Intersection Conflicts through Traffic Control and Operational Improvements	**A1 –** Optimize signal operation (phasing/timing, etc.)	Tried / Proven	Low	Short
	A2 – Optimize clearance intervals	Proven	Low	Short
	A3 – Employ signal coordination along a corridor or route	Proven	Low	Medium
	A4 – Employ emergency vehicle preemption	Proven	Moderate	Medium
B – Reduce Intersection Conflicts through Geometrics	**B1 –** Provide/improve left-turn channelization	Proven	Moderate	Long
C – Improve Pedestrian Safety with Signal Improvements	**C1 –** Install countdown timers	Tried	Low	Short
	C2 – Re-time signals to provide a leading pedestrian interval (advanced walk)	Tried	Low	Short
D – Improve Driver Awareness of Intersections and Signal Control	**D2 –** Improve visibility of signals (overhead indications, 12-inch lenses, background shields, LEDs) and signs (mast arm mounted street names) at intersections	Tried	Low	Short
E – Improve Driver Compliance with Traffic Control Devices	**E1 –** Supplement conventional enforcement of red-light running with confirmation lights; include a public information campaign to increase awareness and compliance	Tried	Low	Short
F – Improve Safety through other Infrastructure Treatments	**F1 –** Restrict or eliminate parking on intersection approaches	Proven	Low	Short

Notes:
[1] Cost: Low = <$100,000 per intersection; Moderate = $100,000 to $500,000 per intersection; High = >$500,000 per intersection
[2] Implementation: Short = <1 year; Medium = 1 to 2 years; Long = >2 years
Source: NCHRP *Report 500* Series, 2004

TABLE 3-9
Unsignalized Intersection Strategies (Infrastructure Strategies)

Objectives	Strategies	Effectiveness	Cost to Implement and Operate[1]	Timeframe for Implementation[2]
A – Reduce the Frequency and Severity of Intersection Conflicts through Geometric Design Improvements	**A1 –** Provide left-turn lanes at intersections	Proven	Moderate	Medium
	A2 – Provide offset turn lanes at intersections	Tried	Moderate to High	Medium
	A3 – Realign intersection approaches to reduce or eliminate intersection skew	Proven	High	Medium
	A4 – Improve pedestrian and bicycle facilities to reduce conflicts between motorists and nonmotorists	Varies	Moderate	Medium
	A5 – Use indirect left-turn treatments to minimize conflicts at divided highway intersections	Tried	Moderate	Medium
B – Improve Sight Distance at Unsignalized Intersections	**B1 –** Clear sight triangle on approaches and in medians by clearing grub, eliminating parking, etc.	Tried	Low	Short
C – Improve Driver Awareness of Intersections as Viewed from the Intersection Approach	**C1 –** Improve visibility of intersections by providing enhanced signing, delineation or pavement markings/messages (stop bar, larger regulatory signs, LED stop signs, etc.)	Tried	Low	Short
	C2 – Improve visibility of intersections by providing appropriate street lighting	Proven	Low to Moderate	Medium
	C3 – Install larger regulatory and warning signs at intersections, including the use of dynamic warning signs at appropriate intersections	Tried	Low t	Short
	C4 – Call attention to the intersection by installing rumble strips or splitter islands on intersection approaches	Tried	Low to Moderate	Medium
D – Appropriate Intersection Traffic Control to Minimize Crash Frequency and Severity	**D1 –** Construct roundabouts at appropriate locations	Proven	High	Long

Notes:
[1] Cost: Low = <$50,000 per intersection; Moderate = $50,000 to $500,000 per intersection; High = >$500,000 per intersection
[2] Implementation: Short = <1 year; Medium = 1 to 2 years; Long = >2 years
Source: NCHRP *Report 500* Series, 2003

TABLE 3-10
Urban Segment Strategies (Infrastructure Strategies)

Objectives	Strategies	Effectiveness	Cost to Implement and Operate[1]	Timeframe for Implementation[2]
A – Include Pedestrian and Bicycle Accommodations	**A1 –** Install sidewalks in appropriate locations	Proven	Moderate to High	Medium
	A2 – Minimize pedestrian crossing distances using curb extensions or median islands	Proven	Low	Medium
B – Improve Roadway Configuration to Accommodate Left Turns	**B1 –** Restripe roadway to a three-lane (road diet) or five-lane cross section	Proven	Low	Medium
C – Improve Access Management Near Intersections	**C1 –** Restrict or eliminate turning maneuvers by providing channelization or closing median openings	Tried	Low	Short
	C2 – Restrict access to properties using driveway closures or turn restrictions	Tried	Low	Medium
	C3 – Restrict cross-median access near intersections	Tried	Low	Medium

Notes:
[1] Cost: Low = <$50,000 per intersection; Moderate = $50,000 to $500,000 per intersection; High = >$500,000 per intersection
[2] Implementation: Short = <1 year; Medium = 1 to 2 years; Long = >2 years
Source: NCHRP *Report 500* Series, 2003

TABLE 3-11
Heavy Truck Safety Strategies (Behavioral Strategies)

Objectives	Strategies	Effectiveness	Programs and Tactics
A –Improve Driver Skills	**A1 –** Promote heavy truck driver training and education	Proven	Promote and disseminate information to commercial employers, independent operators/drivers, farmers and farming cooperatives about available driver training courses through the NDDOT, North Dakota Motor Carriers Association, North Dakota Local Technical Assistance Program, Federal Motor Carrier Safety Administration, and other training providers.
	A2 – Expand locally available commercial driver license (CDL) instructors and training Schools.	Proven	Expand the availability of CDL instructors and schools. Course content should cover topics included in the North Dakota Drivers License Division CDL Manual (available at local Drivers License Office and online at www.dot.nd.gov). Currently, one approved North Dakota CDL driver training school (www.nitalaska.com).
B – Strengthen Employer Driver Safety Initiatives Development	**B1 –** Promote development and reinforcement of employer driver safety policies and programs	Tried	Encourage employers to establish traffic safety policies with clear consequences – recognition for compliance and sanctions for failure to comply. Incorporate research results (for example, National Institute for Occupational Safety and Health (NIOSH) Center for Motor Vehicle Safety, North Dakota State University (NDSU) Upper Great Plains Transportation Institute, etc.) to support safe and effective work organization, hours of work, and driver fatigue polices and program interventions to prevent work-related motor vehicle crashes.
	B2 – Promote use of in-vehicle teen safety technology	Experimental	To help reduce and eliminate commercial driver distractions and high-risk driving maneuvers (excessive speed, and swerves) promote the use of in-vehicle monitoring devices for employer coaching. Promote post-crash driver coaching using safety technology data.
C – Strengthen Public Awareness of Safe Driving	**C1 –** Promote "Share The Road" outreach to public using cooperative agency/industry/academic delivery	Tried	Conduct public outreach on safe driving of passenger vehicles around heavy trucks through cooperative delivery methods with safety partners including: ND Highway Patrol – Motor Carriers Division, ND Motor Carriers Association, ND FMCSA, local high schools and colleges, and other safety stakeholders.
D – Enhance Safety through Enhanced Enforcement	**D1 –** Conduct enhanced enforcement of aggressive passenger vehicles	Proven	Analyze crash data to define high-risk locations for enhanced enforcement and public outreach efforts. Examine roadways with added enforcement where speed limits have been reduced. Conduct a multi-agency, multi-squad car enforcement effort. Agencies work in collaboration to provide data-driven, saturated, high-visibility enforcement at high-risk speed corridors/roadways coupled with media outreach.
	D2 – Conduct high-visibility enforcement of heavy trucks	Proven	Analyze crash data to define high-risk speed locations for enhanced enforcement and public outreach efforts. Examine roadways with added enforcement where speed limits have been reduced. Conduct a multi-agency, multi-squad car enforcement effort. Agencies work in collaboration to provide high-visibility enforcement at high-risk speed corridors/roadways coupled with media outreach.
Sources: NCHRP *Report 500* Series (2004), *NIOSH Center for Motor Vehicle Safety: Strategic Plan for Research and Prevention, 2014-2018* (2014), and various other resources			

TABLE 3-12
Heavy Truck Safety Strategies (Infrastructure Strategies)

Objectives	Strategies	Effectiveness	Cost to Implement and Operate[1]	Timeframe for Implementation[2]
A – Keep Vehicles from Encroaching on the Roadside	**A1 –** Install edge rumble strips (shoulder or edge line)	Proven	Low	Short
	A2 – Install enhanced pavement markings, 6-inch edge line, or embedded wet-reflective pavement markings on section with narrow or no paved shoulders	Experimental/ Tried	Low	Short
	A3 – Provide enhanced shoulders, lighting, delineation (for example, Chevrons), or pavement markings for sharp horizontal curves	Tried / Proven	Low	Short
	A4 – Provide skid-resistance pavement surfaces	Proven	Moderate	Medium
	A5 – Apply shoulder treatments *Eliminate shoulder drop-offs *Safety edge *Widen and/or pave shoulders	Experimental/ Proven	Moderate	Medium
B – Minimize the Likelihood of Crashing into an Object or Overturning if the Vehicle Travels off the Shoulder	**B1 –** Design safer slopes and ditches to prevent rollovers	Proven	Moderate to High	Medium
	B2 – Remove/relocate objects in hazardous locations	Proven	Moderate to High	Medium
C – Minimize the Likelihood of Crashing into an Oncoming Vehicle	**C1 –** Use center buffers, alternating passing lanes or four-lane sections at key locations (Swedish “2+1”)	Tried	Moderate to High	Medium
	C2 – Install centerline rumble strips for two-lane roads	Tried	Low	Short
	C3 – Use climbing lanes at steep grades	Tried	Moderate to High	Medium
D – Reduce the Frequency and Severity of Intersection Conflicts	**D1** – Provide turn lanes at intersections	Proven	Moderate	Medium
	D2 – Widen intersection to accommodate truck turn path to eliminate encroachment	Varies	Moderate	Medium
	D3 – Improve visibility of intersections by providing appropriate street lighting	Proven	Low to Moderate	Medium
	D4 – Install intersection dynamic warning systems	Tried	Low	Short

Notes:
[1] Cost: Low = <$10,000 per mile; Moderate = $10,000 to $100,000 per mile; High = >$100,000 per mile
[2] Implementation: Short = <1 year; Medium = 1 to 2 years; Long = >2 years
Source: NCHRP *Report 500* Series, 2004

3.3 Safety Strategies Workshop

Two Safety Planning Workshops were held as part of the LRSP Phase 3 analysis. The June 4, 2014 meeting in Dickinson included representatives from six counties and the Mandan, Hidatsa, and Arikara (MHA) Nation in the southwestern region. The June 5, 2014 meeting in Williston included representatives from five counties and the City of Williston in the northwestern region. The primary focus of the safety workshops was to discuss and prioritize the safety strategies.

The basic workshop structure included introductions and an overview of the current NDDOT safety program. This was followed by local speakers. Becky Byzewski (Safe Communities Program), Fahtima Finley (MHA Nation), and Capt. Eldon Mehrer (Motor Carriers Division North Dakota Highway Patrol) shared information on local safety initiatives and programs in the southern portion of the western region. Sgt. Jamie Huschka (North Dakota Highway Patrol), Capt. Eldon Mehrer (Motor Carriers Division North Dakota Highway Patrol), and Chief Arthur Walgren (Watford City Police Department) shared information on local safety initiatives and programs in the northern portion of the western region. The morning concluded with a review of the latest crash data on the local roadway system. In the afternoon, the workshop participants discussed potential safety strategies and began the process of prioritizing the strategies. The groups reviewed and discussed driver-behavior and roadway infrastructure strategies. The final agenda item was a voting exercise in which each participant voted for their preferred strategies as a way to focus future efforts for the local roadway programs in their region.

Workshop participants included county, city and tribal road safety engineering, enforcement, and education representatives; elected official representatives from the North Dakota Governor's Office and the North Dakota Senate; North Dakota State University (NDSU); federal road safety staff; and NDDOT staff in order to include a variety of backgrounds and experiences to enable valuable interaction and discussions during the workshop.

3.4 Prioritizing Safety Strategies

Through the group (infrastructure and driver behavior) discussions and voting exercises, the top safety strategies for the western region are:

- **Behavioral strategies**
  - Speed: Identify high-risk speed locations/corridors for enhanced enforcement
  - Young Drivers: Encourage driver education providers (local schools and private providers) to require parent education component
- **Infrastructure strategies**
  - Lane Departure: Install edge rumble strips (shoulder or edge line)
  - Unsignalized Intersection: Provide left-turn lanes at intersections
  - Unsignalized Intersection: Install larger regulatory and warning signs at intersections, including the use of dynamic warning signs at appropriate intersections
  - Heavy Truck: Provide turn lanes at intersections

- Heavy Truck: Install enhanced pavement markings, 6-inch edge line, or embedded wet-reflective pavement markings on section with narrow or no paved shoulders
- Signalized Intersections: Install countdown timers

Infrastructure safety projects that are developed as part of this LRSP are considered eligible for funding through the state's Highway Safety Improvement Program (HSIP). The managers of this program have identified implementation cost and effectiveness as priorities in their evaluation process of selecting projects for funding. Low-cost projects allow the limited funding to support a wider deployment and the use of proven-effective strategies provides the highest level of confidence that a given project will result in an overall crash reduction.

The ability of the selected strategies to reduce crashes is based on information in the FHWA's Crash Modification Factors (CMF) Clearinghouse and other published research. Table 3-13 provides a summary for driver behavior strategies reviewed in Chapter 5 of this report. In addition, Table 3-13 provides a summary of the crash reduction factors that were found in the CMF Clearinghouse for infrastructure safety strategies considered and/or suggested for the western region, along with an estimated unit cost for each strategy. Most factors reported are based on research that was assigned higher-quality ratings.

TABLE 3-13
Proposed Strategies, Crash Reduction Factors, and Typical Installation Costs

Strategy	Crash Reduction Factor [a]	Typical Installation Costs
Impaired Driving		
Support community programs for alternative transportation	Up to 15% reduction in alcohol-related crashes	Low to moderate, depending on fares and tavern contributions
Promote sobriety initiatives for DUI offenders	Varies, depending on the program structure	
Educate and enforce zero tolerance laws for drivers under age 21	Up to 30% reduction when highly publicized	Up to $50 per hour of officer overtime
Speeding and Aggressive Driving		
Conduct high-visibility targeted enforcement of speeding and aggressive driving	3%	Up to $50 per hour of officer overtime
Young Drivers		
Encourage driver education providers to require parent education component	2%	$1,500 per school district
Seat Belt Use		
Enforce secondary seat belt use law	3% to 5% increase in seat belt use; depending on intensity of enforcement	Up to $50 per hour of officer overtime
Pursue local support for primary seat belt law	Up to a 9% increase in seat belt use after a state law is passed	Low to moderate
Rural Segments		
4-inch latex edge line		$1,320 per mile
4-inch latex centerline		$660 per mile
6-inch latex edge line	10% to 45% all rural serious crashes	$1,980 per mile
Shoulder or edge line rumble strips	20% run off road crashes	$5,850 per mile

TABLE 3-13
Proposed Strategies, Crash Reduction Factors, and Typical Installation Costs

Strategy	Crash Reduction Factor [a]	Typical Installation Costs
Ground in wet-reflective markings		$36,000 per mile
Centerline rumble strips	40% head-on/sideswipe-crashes	$3,600 per mile
6-inch centerline		$1,020 per mile
Rural Curves		
Chevrons	20% to 30%	$3,960 per curve
Arrow board only		$1,200 per curve
Advance warning sign and advisory speed plaque		$1,440 per curve
2-foot paved shoulder and shoulder rumble strips	20% to 30% run-off-the-road crashes	$54,400 per mile +$5,850 per mile
Rural Intersections		
Roundabout	20% to 50% all crashes/ 60% to 90% right-angle crashes	$4,200,000 per intersection
Directional median (RCI or J-Turn)	17% all crashes/ 100% angle crashes	$1,080,000 per intersection
Mainline dynamic warning sign	50% all crashes/ 75% serious right-angle crashes	$60,000 per intersection
Close median		$30,000 per intersection
Intersection lighting	25% to 40% nighttime crashes	$10,200 per streetlight
Upgrade signs and pavement markings	40% upgrade of all signs and pavement markings/ 15% for STOP AHEAD pavement marking	$2,640 per approach [b]
Clear sight triangle	37% serious injury crashes [c]	$2,940 per intersection [d]
Urban		
Conversions (three-lane/five-lane)	30% to 50%	$48,000 per mile [three-lane] $54,000 per mile [five-lane] +$36,000 per signalized intersection for updates (for example, loop and signal head placement)
Access management	5% to 31%	$360,000 per mile [e]
Signal – confirmation lights	25% to 84% reduction in violations	$1,200 per two approaches
Pedestrian/bicycle – advanced walk	Up to 60% pedestrian/vehicle crashes	$600 per intersection
Pedestrian/bicycle – countdown timers	25% vehicle/pedestrian crashes	$12,000 per intersection
Pedestrian/bicycle – curb extensions	Increase in vehicles yielding to pedestrians	$36,000 per corner
Pedestrian/bicycle – median refuge island	46% in vehicle/pedestrian crashes	$24,000 per approach

TABLE 3-13
Proposed Strategies, Crash Reduction Factors, and Typical Installation Costs

Strategy	Crash Reduction Factor [a]	Typical Installation Costs

Notes:

[a] Crash reduction factors based on review of CMF Clearinghouse and other published research

[b] Includes $540 per STOP sign, $540 per junction sign assembly, $600 per STOP AHEAD sign, $600 per STOP AHEAD pavement marking message, and $360 per stop bar

[c] Reduction based on increasing sight distance triangle

[d] Inclusive of sign upgrades identified and materials and labor for clearing of sight triangle.

[e] For management of unsignalized intersection movements within a corridor that has a divided median. Typical project may include minor street diverters, signed turn restrictions, and median closings.

N/A = not applicable

4.0 Western Region Infrastructure Safety Projects

4.1 Western Region Proactive Project Decision Process

The primary objectives of the LRSP effort are to identify low-cost, safety-related infrastructure projects focused on each county's documented safety emphasis areas and target crash types. These emphasis areas account for the greatest number of serious crashes occurring on the local road system. Mitigating the factors that contribute to these crashes will assist each county in reducing serious crashes on the local road system.

Projects were developed that include identifying a specific improvement at a specific location based on risk factors described in Chapter 2 and the high-priority safety strategies described in Chapter 3. Improvement strategies are consistent with the NDDOT's SHSP with a focus on proven effectiveness at reducing the target crash type and low cost of implementation. Proven-effective strategies give safety program managers the highest level of confidence that the deployment will result in a reduction of crashes. Low-cost strategies allow improvements to be widely deployed across a system to address the low density of crashes and are less expensive than complete reconstruction of high-risk locations. Project development and mitigation focused on the following improvements:

- **Rural**
  - Lane-departure crashes along roadway segments and in curves
  - Intersection-related crashes
- **Urban**
  - Rear-end and head-on crashes on roadway segments
  - Angle crashes and pedestrian and bicycle crashes at intersections

As described in Chapter 2, heavy vehicles crashes are a priority for the western region and the NDDOT will take the lead in addressing these crashes since the majority occurred on state highways. Of the severe crashes involving heavy vehicles on the local road system, the predominant crash types in the western region suggest that the systemic projects for county roads and city streets effectively address these crashes. Therefore, agencies may refer to the suggested infrastructure countermeasures for at-risk locations for heavy vehicle crashes.

For consistency across the western region, project decision trees were created so that locations with similar characteristics across the region received the same suggested mitigation treatment. Projects were chosen based on the identification of at-risk locations and the availability of proven strategies for crash reduction. This resulted in a systemic focus on rural paved roadway segments, horizontal paved curves, and rural intersections. In cities with populations over 5,000, the focus was on arterial and collector roadway segments and intersections along these segments. Projects were originally suggested based on the technical analysis and then revised in accordance with input from the local agencies and the NDDOT.

High-priority rural roadway segment projects focused on addressing the most common type of serious segment-related crash—a single-vehicle, lane-departure crash—by implementing road edge improvements to alert drivers when they are drifting too far along the road edge (Figure 4-1).

High-priority rural curve projects focused on enhancing the curve delineation to improve the driver's ability to successfully navigate the curves (Figure 4-2). As shown in the figure, a curve is eligible for a safety improvement project in three ways.

High-priority rural intersection projects (Figure 4-3) focused on addressing the most common type of serious intersection crash—a right-angle collision—by making the intersection more visible to drivers and by reducing the number of intersection conflicts. Examples of suggested projects are shown in Figure 4-4.

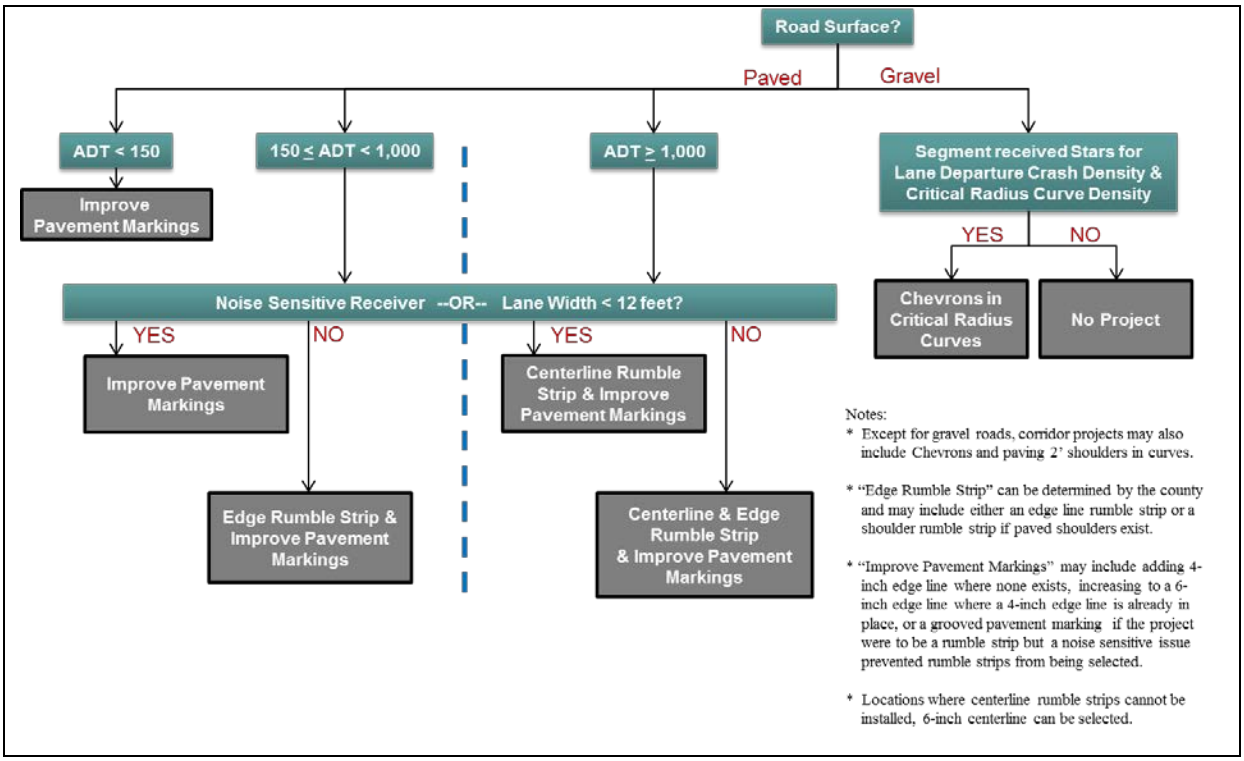


FIGURE 4-1
High-Priority Rural Roadway Segment Project Decision Tree

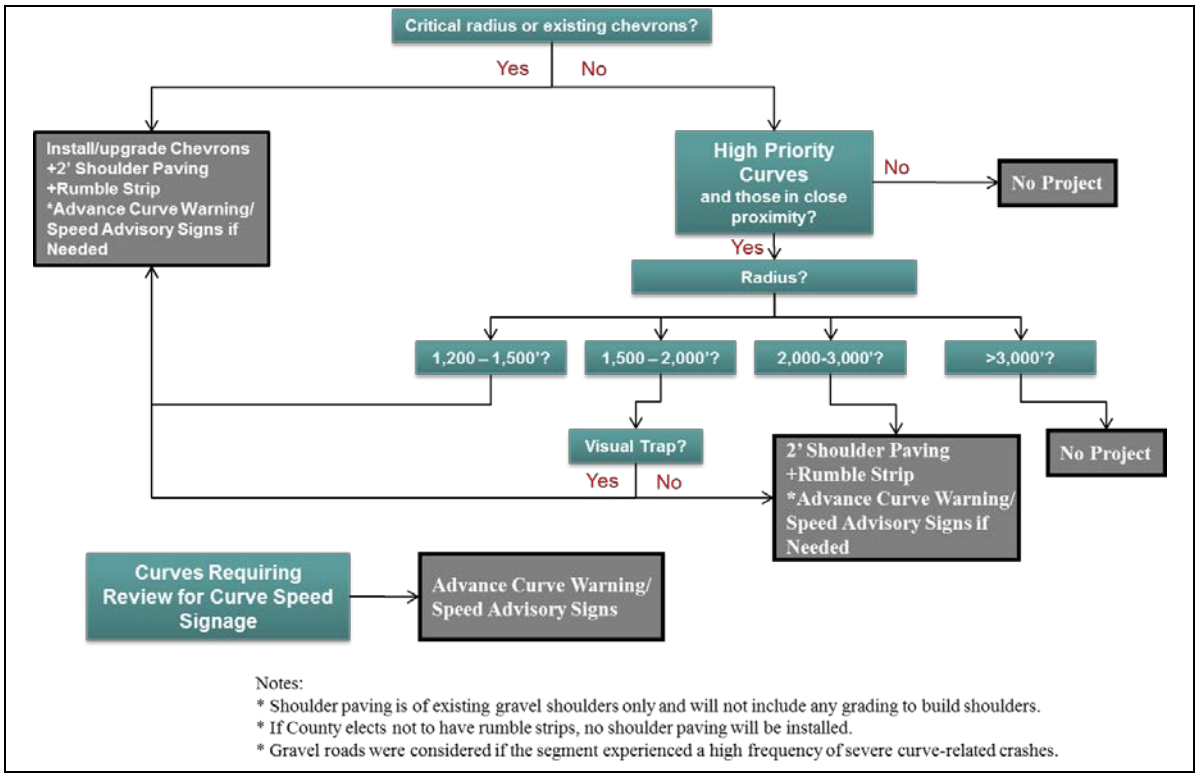


FIGURE 4-2
High-Priority Rural Curve Project Decision Tree

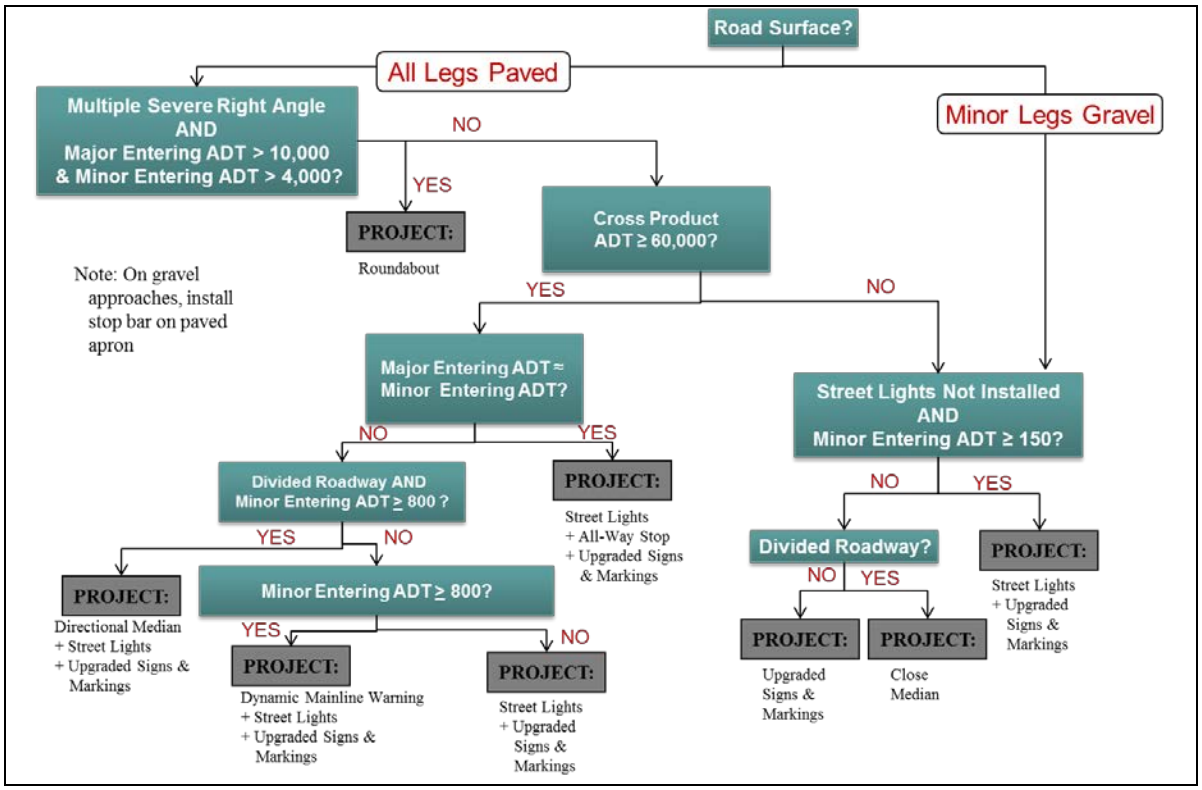
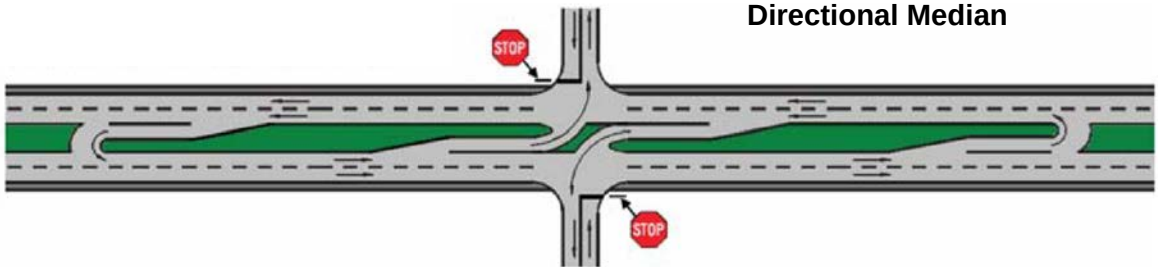
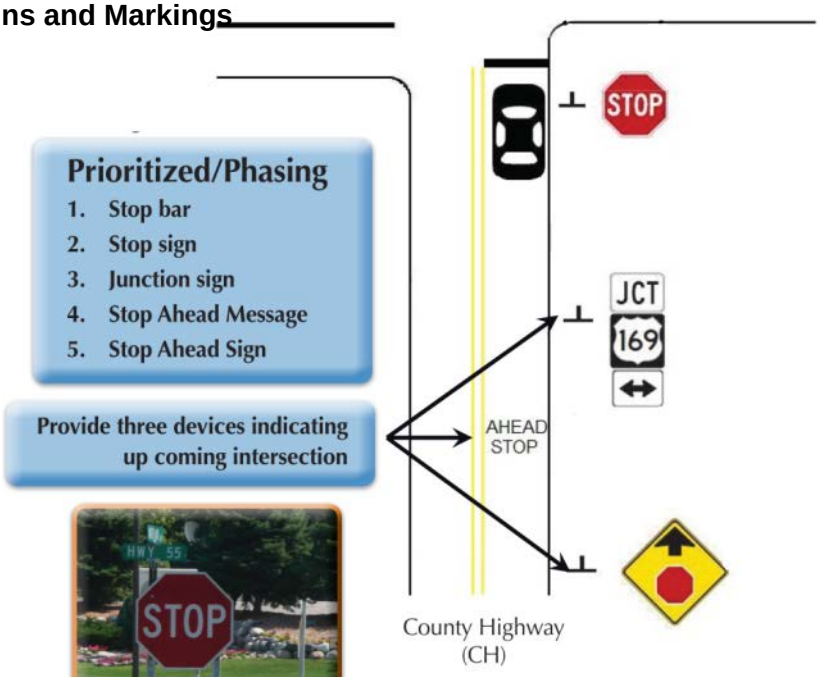


FIGURE 4-3
High-Priority Rural Intersection Project Decision Tree

Directional Median



Upgraded Signs and Markings



Project may include some or all of the items based on detailed field assessment.

Source: *Minnesota DOT District 3-13 County RSA,* CH2M HILL, 2006

FIGURE 4-4
Intersection Safety Strategies Considered for Deployment

High-priority urban roadway segment projects focused on reducing rear-end and head-on crashes by creating buffer space in the middle of the roadway. This buffer space would be created by converting to a three-lane or five-lane roadway and by better managing access along divided arterials (Figure 4-5).

High-priority urban right-angle intersection projects focused on reducing right-angle crashes by reducing red-light running and managing access to reduce the number of conflict points along a corridor, particularly at signalized intersections (Figure 4-6).

High-priority urban pedestrian and bicycle intersection projects focused on reducing pedestrian and bicycle crashes by providing shorter crossing distances, curb extensions or median refuge islands, as well as advanced walk intervals and countdown timers at signalized intersections (Figure 4-7).

Project forms were completed for each high-priority intersection, curve, and roadway segment, including a description of the location, brief crash history, ranking factors, and the identified safety strategy. These forms were formatted so they could be submitted directly through the HSIP process, but may require supplemental information for the evaluation and scoring process.

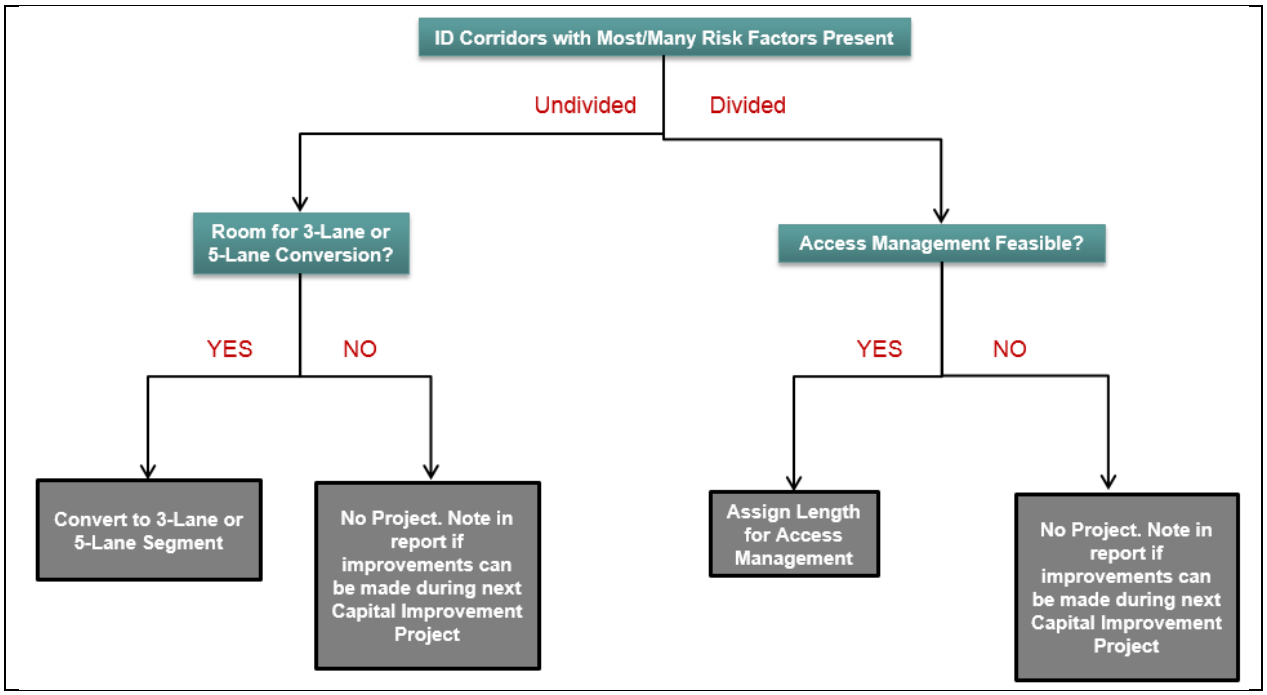


FIGURE 4-5
High-Priority Urban Roadway Segment (Turning) Project Decision Tree

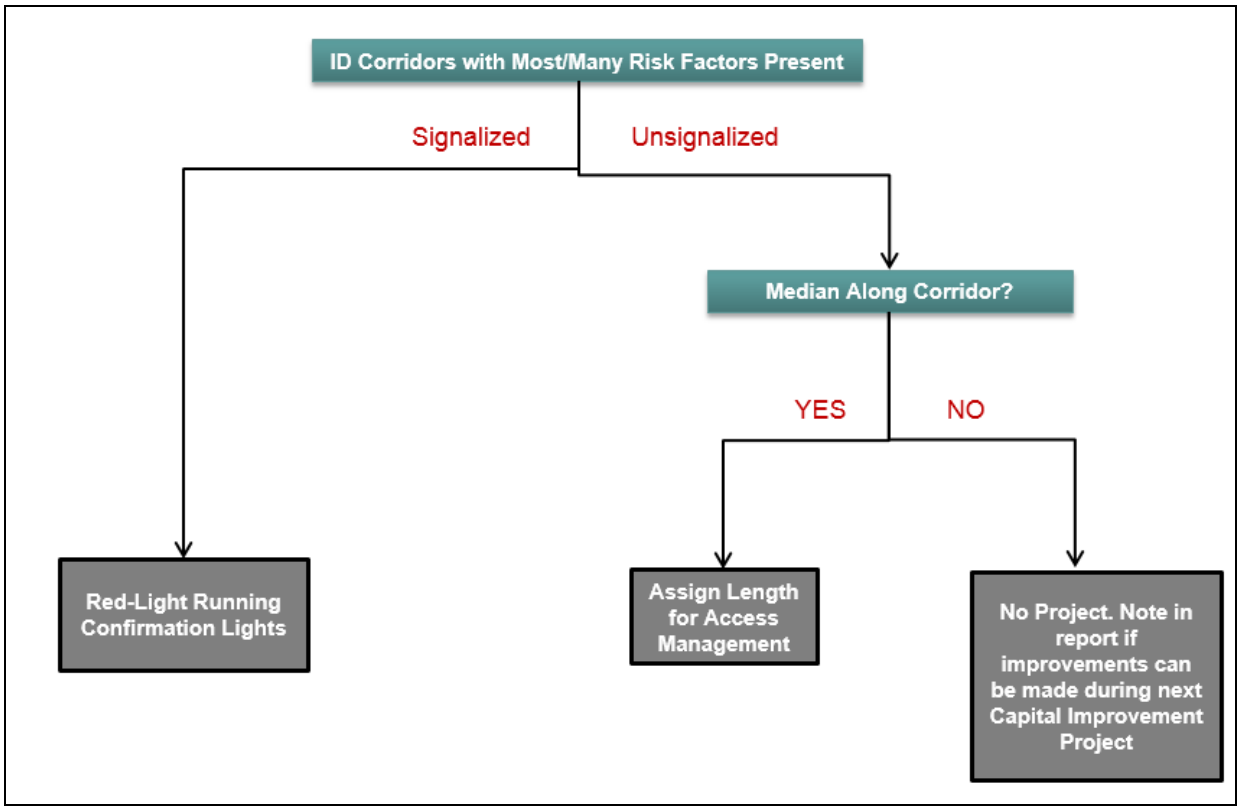


FIGURE 4-6
High-Priority Urban Right-Angle Intersection (Signalized) Project Decision Tree

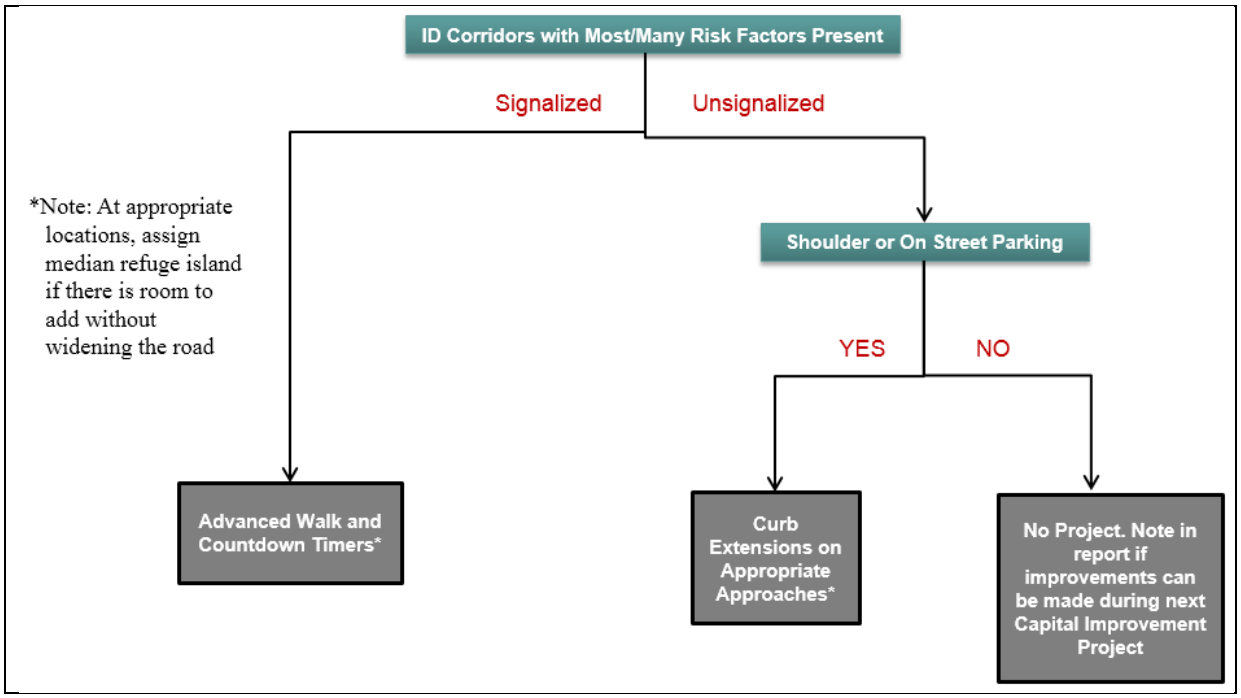


FIGURE 4-7
High-Priority Urban Pedestrian and Bicyclist Intersection Project Decision Tree

The suggested low-cost safety projects for the western region are described in the following sections. The costs assigned to each project are planning level estimates and do not include right-of-way or some other supplemental costs such as signal revisions or replacement for three-lane conversion projects. Because of funding limitations, all potential projects would not be completed in 1 year. The actual schedule for implementing individual projects will necessitate securing funding from the state's HSIP. The safety planning process followed for the western region is consistent with the North Dakota SHSP. In addition, several of the high-priority safety strategies are among those recommended for the state road system in the state's SHSP.

It is not expected or required that each county or city pursue safety projects in the suggested ranking order. The ranking suggests general priorities, given that actual project development decisions will be made by each county or city staff based on economic, social, and political issues and in coordination with other pavement and reconstruction projects that are part of the county's Capital Improvement Program.

Many project details are still undetermined, including general project termini. Each county or city will determine specific project details (such as termini and exceptions) as decisions regarding implementation of specific projects are made. These decisions may require that the county coordinate with various municipal departments, the public, and other county transportation departments.

The total cost of projects suggested for the western region is $16,180,361. A cost breakout by project type and county/city is provided in Table 4-1.

TABLE 4-1
Western Region Total Safety Project Costs

Rural Projects	Roadway Segments	Intersections	Curves	Total
Adams County	$69,471	$84,960	$65,733	$220,164
Billings County	$54,332	$84,360	$90,438	$229,130
Bowman County	$77,652	$148,560	$181,957	$408,169
Burke County	$33,488	$94,200	$18,651	$146,339
Divide County	$82,719	$142,200	$16,355	$241,274
Dunn County	$89,973	$330,360	$42,660	$462,993
Golden Valley County	$36,060	$27,720	$21,240	$85,020
Grant County	$0	$75,240	$96,480	$171,720
Hettinger County	$82,345	$59,520	$18,752	$160,616
McKenzie County	$187,125	$647,760	$111,235	$946,120
McLean County	$140,181	$3,485,940	$49,221	$3,675,343
Mercer County	$366,048	$300,720	$119,618	$786,386
Mountrail County	$51,084	$2,679,780	$24,141	$2,755,005
Renville County	$163,800	$65,880	$137,187	$366,867
Slope County	$7,605	$31,200	$22,107	$60,912
Stark County	$504,203	$375,180	$57,701	$937,085
Williams County	$316,395	$1,626,780	$205,197	$2,148,372
Theodore Roosevelt National Park	$125,700	$13,320	$0	$139,020
Urban Projects	**Roadway Segments**	**Intersections – Right-Angle**	**Intersections – Pedestrians and Bicyclists**	**Total**
City of Dickinson	$632,667	$8,400	$558,000	$1,199,067
City of Williston	$596,160	$6,000	$438,600	$1,040,760

Adams County

The total project cost suggested for Adams County is $220.164. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-2. High-priority locations that received a project are shown in Figure 4-8. These locations are described in further detail in Appendix: Adams County, along with priority rankings and suggested project sheets.

TABLE 4-2
Adams County Project Costs

Project Type	Cost
Intersections	$84,960
Roadway Segments	$69,471
Curves	$65,733
Total	**$220,164**

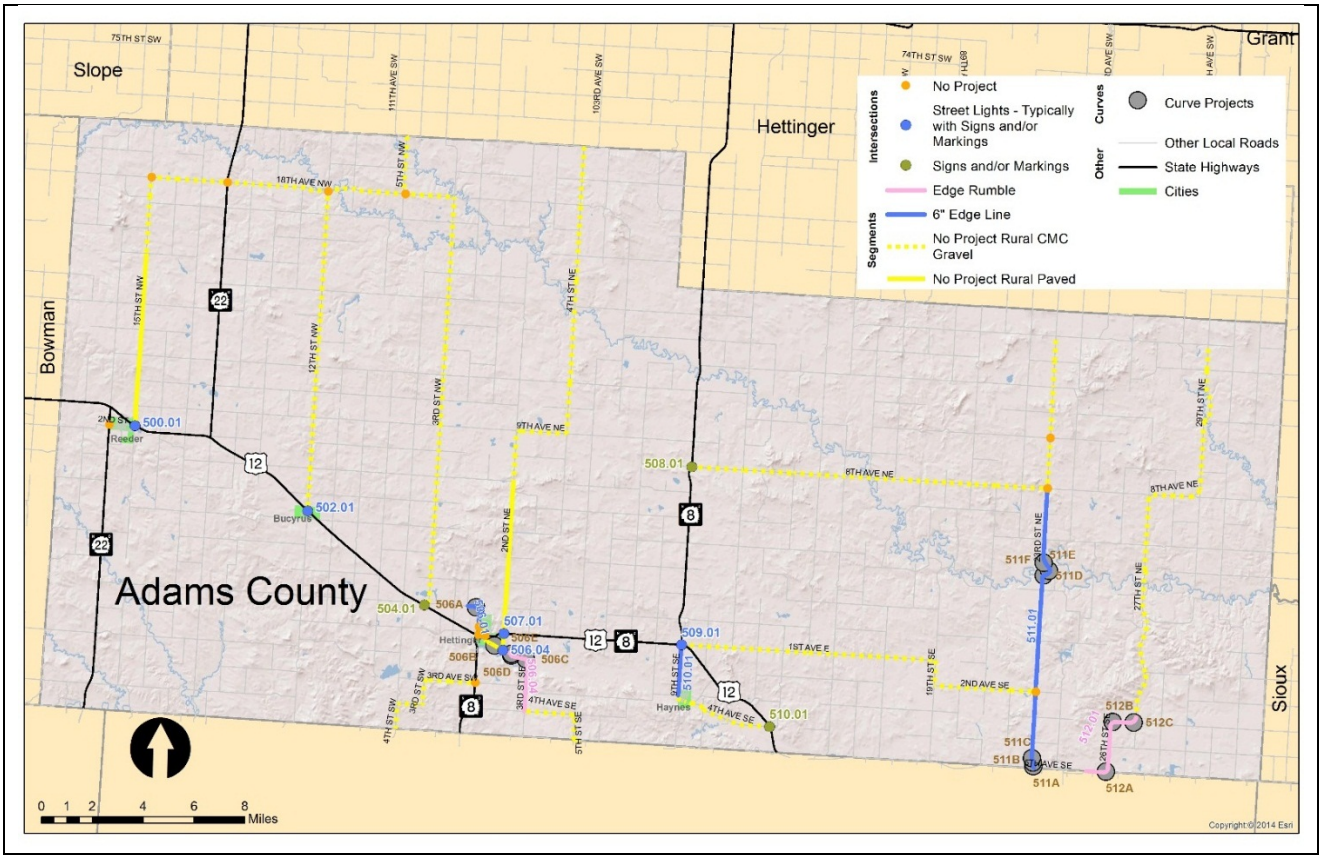


FIGURE 4-8
Adams County Project Locations Map

Billings County

The total project cost suggested for Billings County is $229,130. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-3. High-priority locations that received a project are shown in Figure 4-9. These locations are described in further detail in Appendix: Billings County, along with priority rankings and suggested project sheets.

TABLE 4-3
Billings County Project Costs

Project Type	Cost
Intersections	$84,360
Roadway Segments	$54,332
Curves	$90,438
Total	**$229,130**

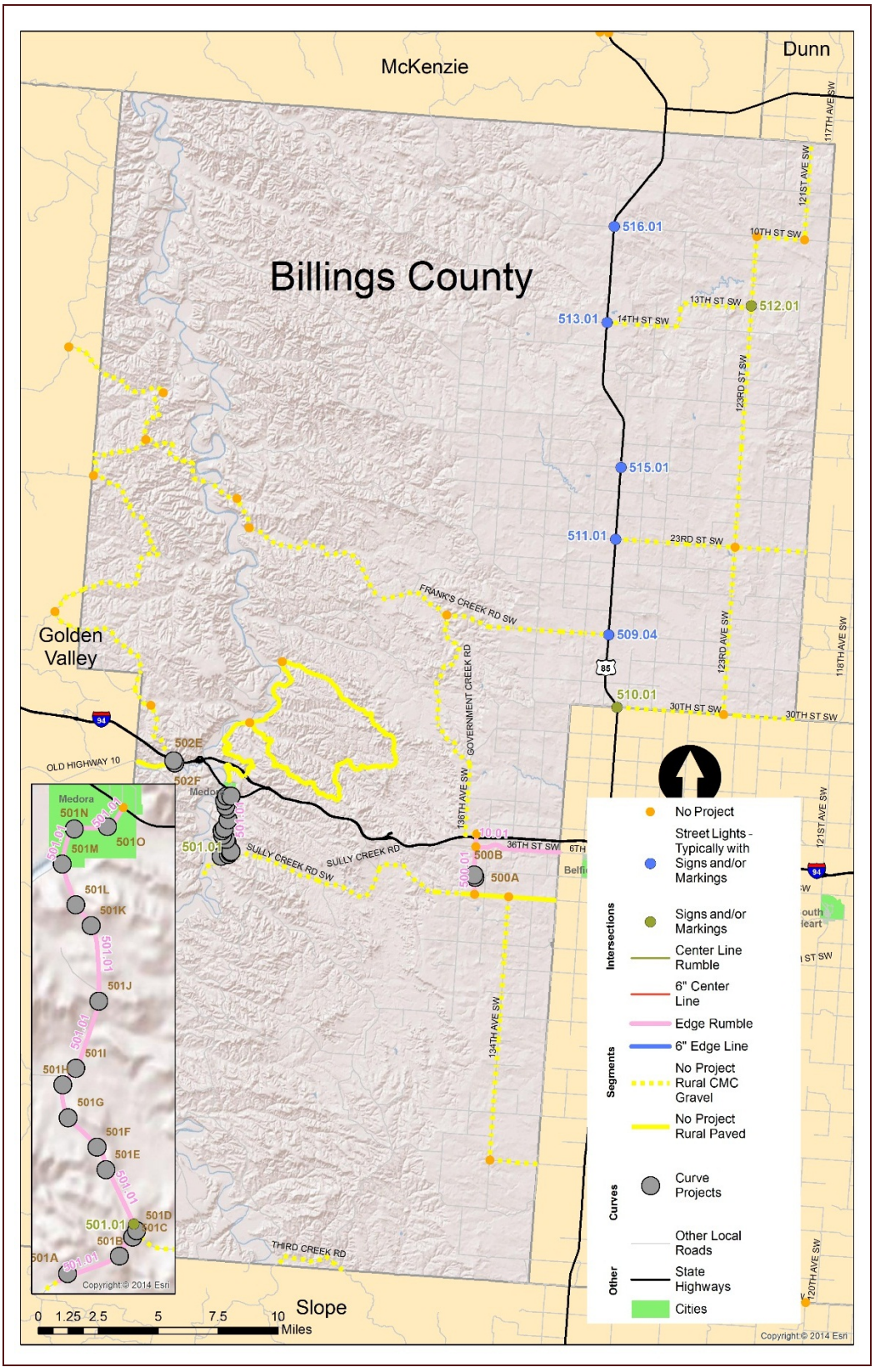


FIGURE 4-9
Billings County Projects Location Map

Bowman County

The total project cost suggested for Bowman County is $408,169. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-4. High-priority locations that received a project are shown in Figure 4-10. These locations are described in further detail in Appendix: Bowman County, along with priority rankings and suggested project sheets.

TABLE 4-4
Bowman County Project Costs

Project Type	Cost
Intersections	$148,560
Roadway Segments	$77,652
Curves	$181,957
Total	**$408,169**

One roadway segment identified as a high-priority location did not receive projects. Half of this segment is located within the city limits of Bowman and is an urban designed roadway where rural projects would not apply. The remaining portion of the roadway segment was too short to be considered for a corridor project (Table 4-5).

TABLE 4-5
Bowman County Priority Roadway Segment Locations without Suggested Treatments

Segment ID	Local Name	Segment Start	Segment End	Location Notes
508.01	11th Avenue NW	US 12	6th Street NW	Short segment – removed from consideration

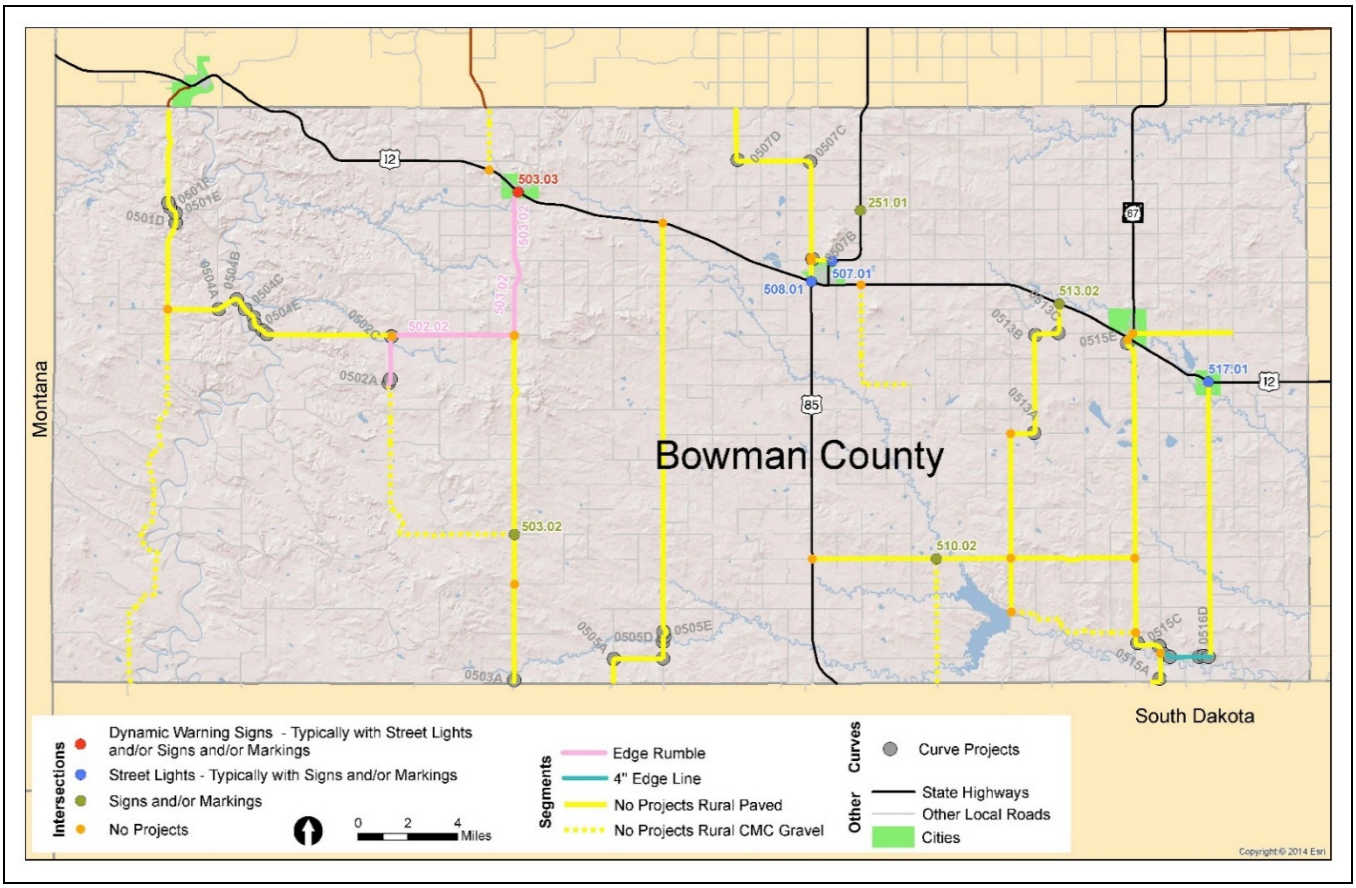


FIGURE 4-10
Bowman County Project Locations Map

Burke County

The total project cost suggested for Burke County is $146,339. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-6. High-priority locations that received a project are shown in Figure 4-11. These locations are described in further detail in Appendix: Burke County, along with priority rankings and suggested project sheets.

TABLE 4-6
Burke County Project Costs

Project Type	Cost
Intersections	$94,200
Roadway Segments	$33,488
Curves	$18,651
Total	**$146,339**

Two roadway segments identified as high-priority locations did not receive projects. These roadway segments were recently rehabilitated under the oil county project; therefore, no projects were suggested since these new treatments reduce lane-departure crashes (Table 4-7).

TABLE 4-7
Burke County Priority Roadway Segment Locations without Suggested Treatments

Segment ID	Local Name	Segment Start	Segment End	Location Notes
17.01	69th Avenue NW/ 93rd Street NW/ 70th Avenue NW	Burke/Ward County Line	ND 8/Main Street	Edge rumble projects constructed as part of oil county projects
11.01	88th Avenue NW/ Kings Highway/ 86th Avenue NW/ 85th Avenue NW	ND 50/ 79th Street NW	Burke 8/ 94th Street NW	Edge rumble projects constructed as part of oil county projects

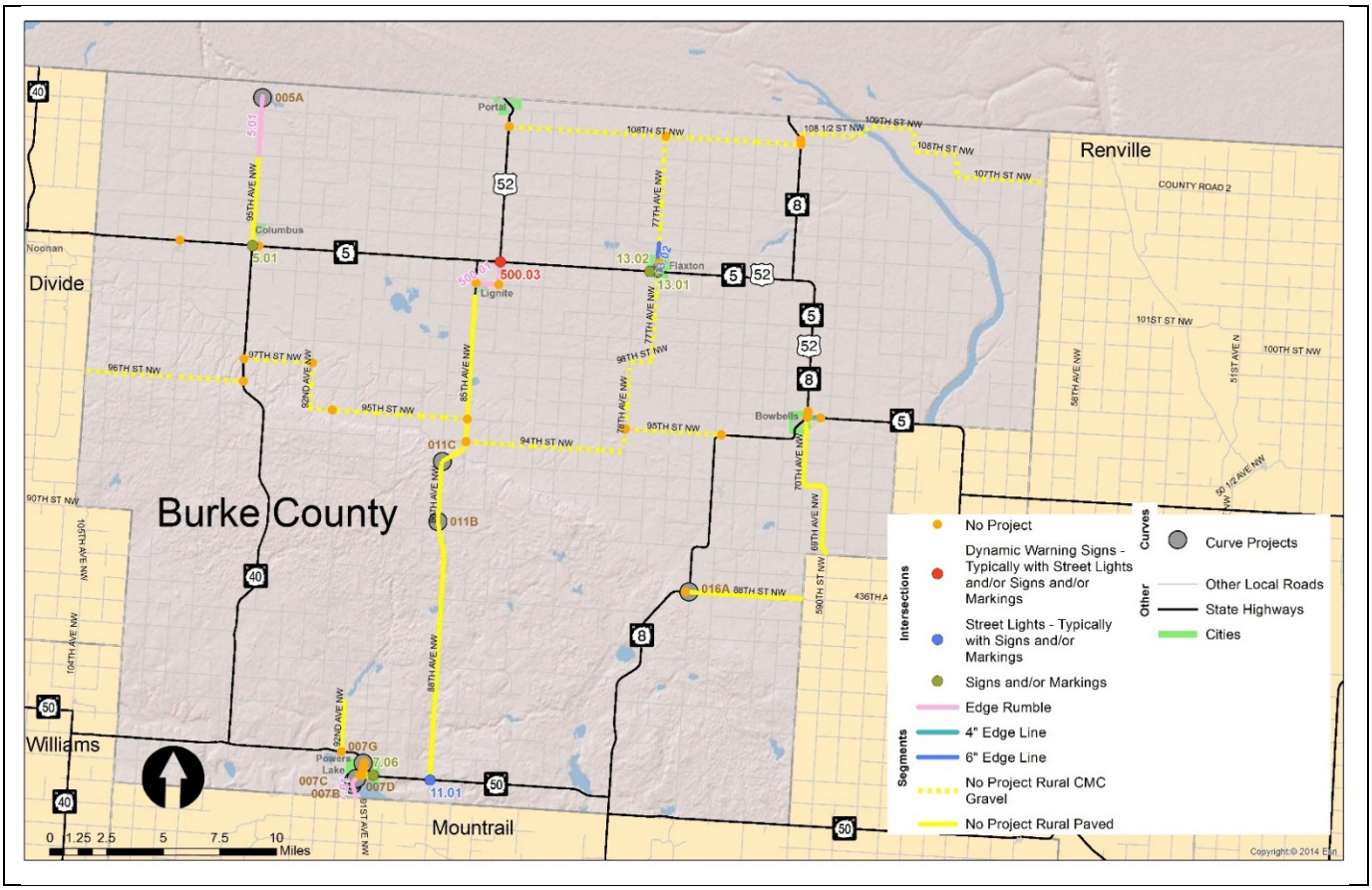


FIGURE 4-11
Burke County Project Locations Map

Divide County

The total project cost suggested for Divide County is $241,274. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-8. High-priority locations that received a project are shown in Figure 4-12. These locations are described in further detail in Appendix: Divide County, along with priority rankings and suggested project sheets.

TABLE 4-8
Divide County Project Costs

Project Type	Cost
Intersections	$142,200
Roadway Segments	$82,719
Curves	$16,355
Total	**$241,274**

One roadway segment identified as a high-priority location did not receive a project. This roadway segment was recently rehabilitated under the oil county project; therefore, no project was suggested since this new treatment reduces lane-departure crashes (Table 4-9).

TABLE 4-9
Divide County Priority Roadway Segment Locations without Suggested Treatments

Segment ID	Local Name	Segment Start	Segment End	Locations Notes
3.01	153rd Avenue NW/ 152nd Avenue NW	Montana/North Dakota State Line	97th Street NW	Edge rumble projects constructed as part of oil county projects

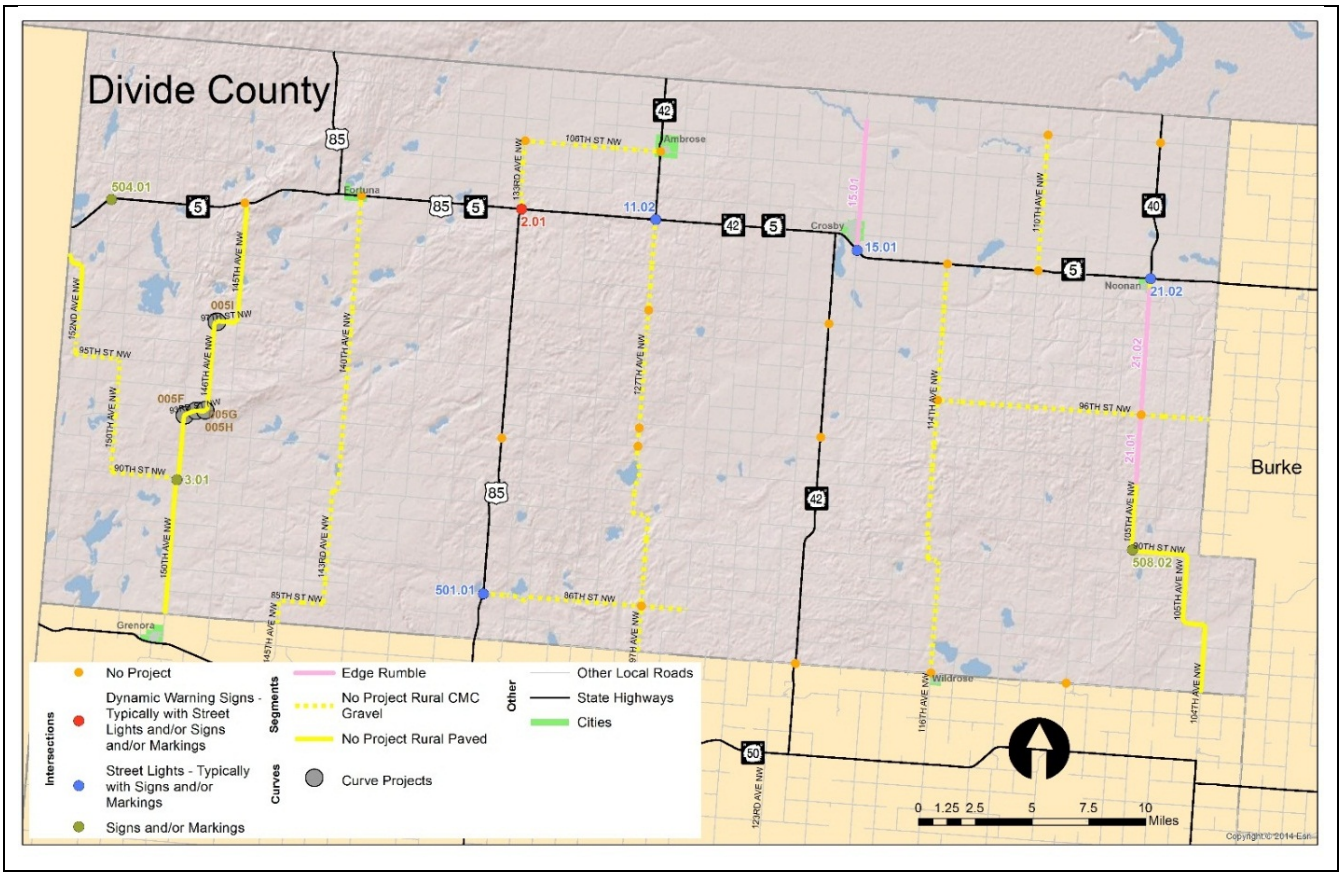


FIGURE 4-12
Divide County Project Locations Map

Dunn County

The total project cost suggested for Dunn County is $462,993. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-10. High-priority locations that received a project are shown in Figure 4-13. These locations are described in further detail in Appendix: Dunn County, along with priority rankings and suggested project sheets.

TABLE 4-10
Dunn County Project Costs

Project Type	Cost
Intersections	$330,360
Roadway Segments	$89,973
Curves	$42,660
Total	**$462,993**

One roadway segment identified as a high-priority location did not receive projects. The paved portion of this segment is approximately 0.85 mile before it becomes gravel. Due to the lack of paved roadway along this corridor, this roadway segment was removed from project consideration (Table 4-11).

TABLE 4-11
Dunn County Priority Roadway Segment Locations without Suggested Treatments

Segment ID	Local Name	Segment Start	Segment End	Location Notes
510.02	12th Street NW	109th Avenue SW	ND 22	Short segment – removed from consideration

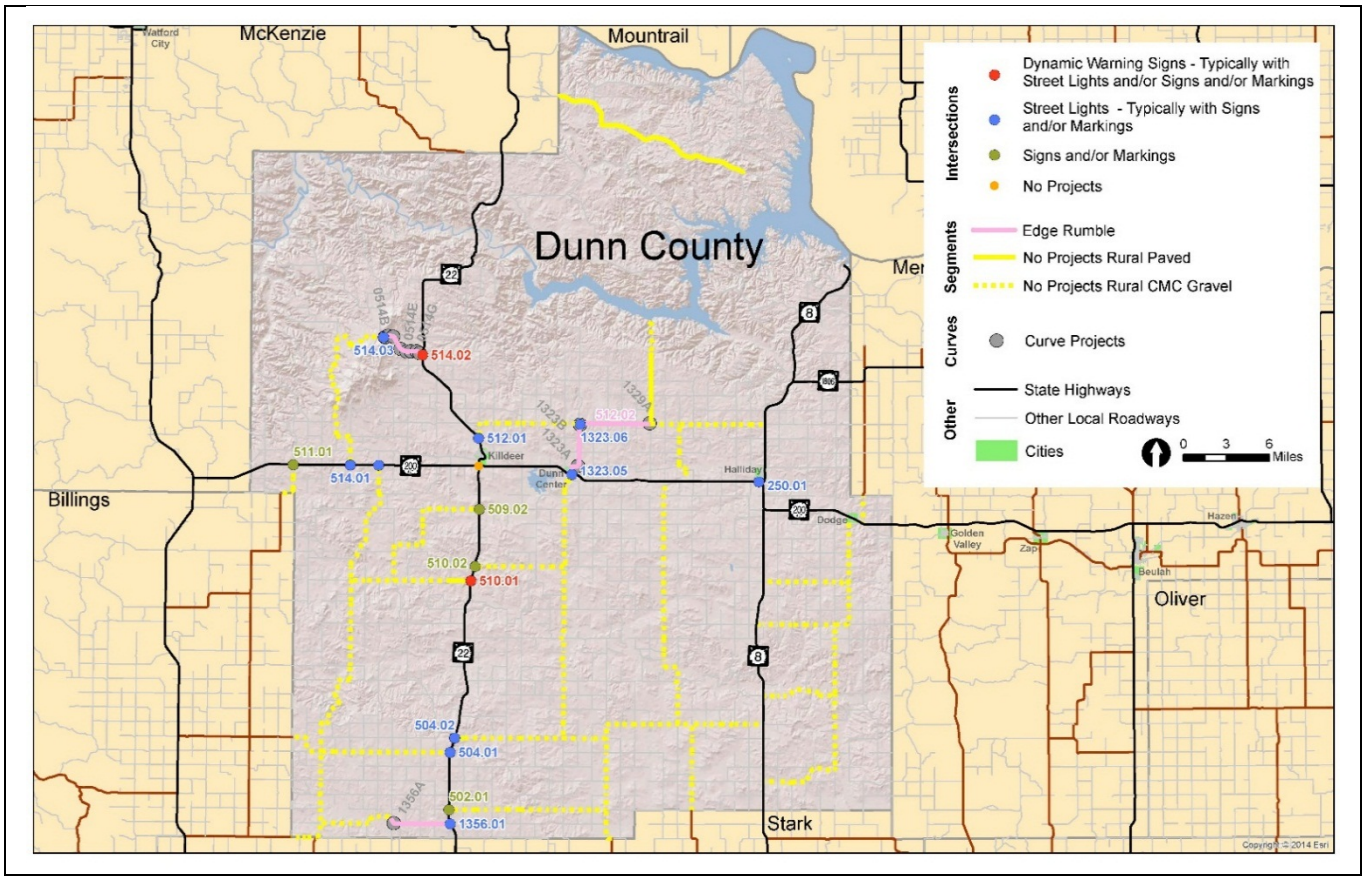


FIGURE 4-13
Dunn County Project Locations Map

Golden Valley County

The total project cost suggested for Golden Valley County is $85,020. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-12. High-priority locations that received a project are shown in Figure 4-14. These locations are described in further detail in Appendix: Golden Valley County, along with priority rankings and suggested project sheets.

TABLE 4-12
Golden Valley County Project Costs

Project Type	Cost
Intersections	$27,720
Roadway Segments	$36,060
Curves	$21,240
Total	**$85,020**

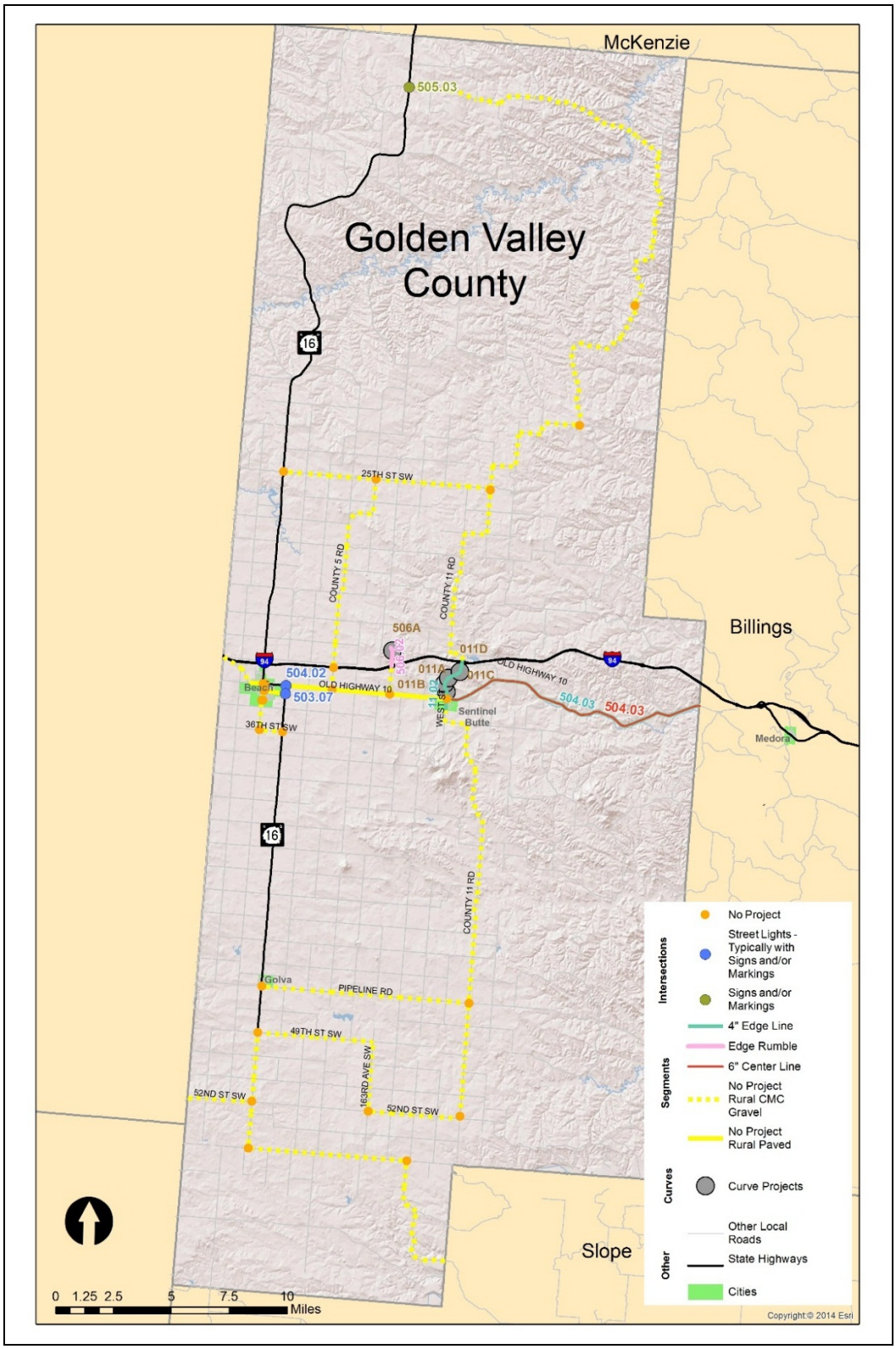


FIGURE 4-14
Golden Valley County Project Locations Map

Grant County

The total project cost suggested for Grant County is $171,720. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-13. High-priority locations that received a project are shown in Figure 4-15. These locations are described in further detail in Appendix: Grant County, along with priority rankings and suggested project sheets.

TABLE 4-13
Grant County Project Costs

Project Type	Cost
Intersections	$75,240
Roadway Segments	$0
Curves	$96,480
Total	**$171,720**

One roadway segment identified as a high-priority location did not receive projects. The majority of this segment is located within the city limits of Carson and is an urban designed roadway where rural projects would not apply. The remaining portion of the roadway segment was too short to be considered for a corridor project (Table 4-14).

TABLE 4-14
Grant County Priority Roadway Segment Locations without Suggested Treatments

Segment ID	Local Name	Segment Start	Segment End	Location Notes
503.03	55th Avenue SW/ Idaho Street	4th Avenue/ Minnesota Street	ND 21	Short segment – removed from consideration

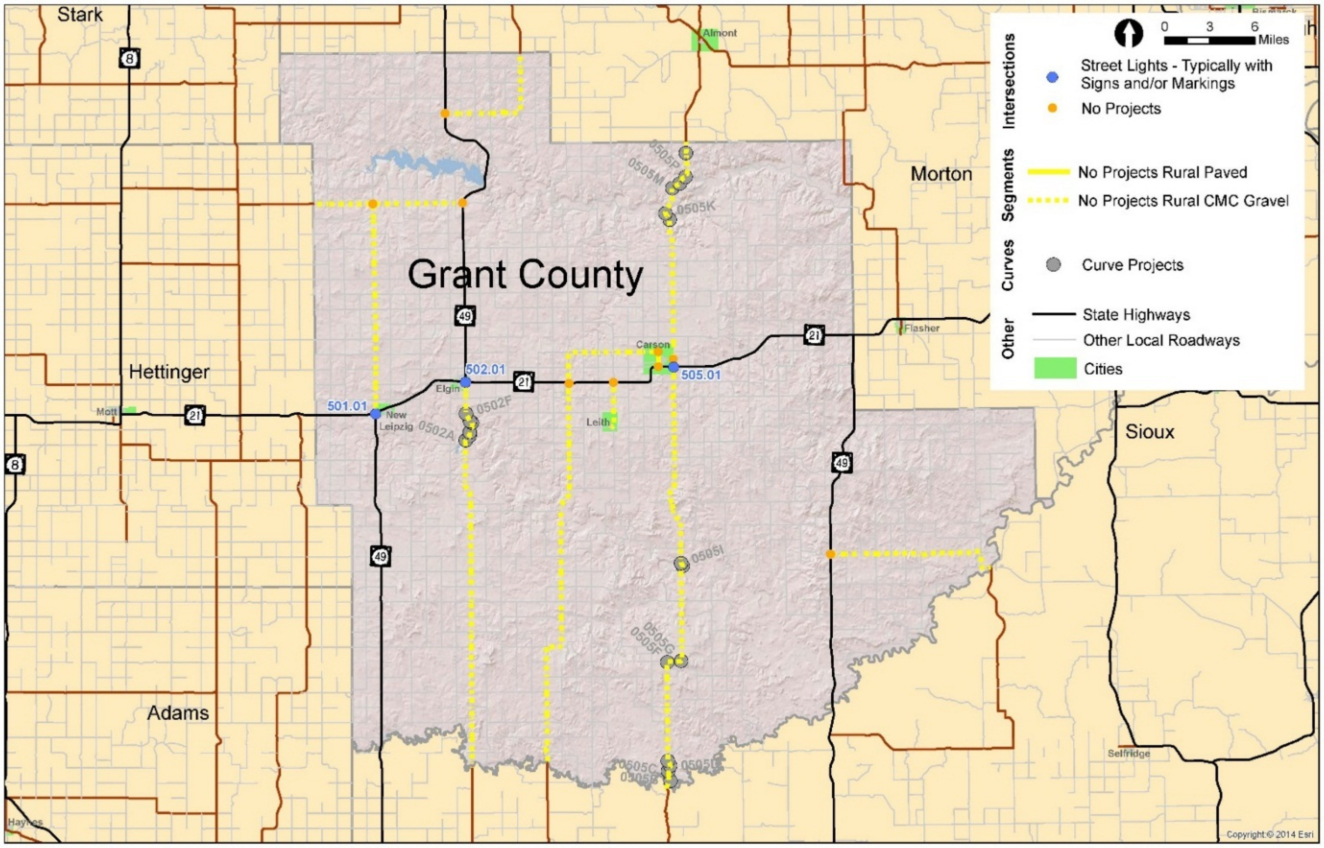


FIGURE 4-15
Grant County Project Locations Map

Hettinger County

The total project cost suggested for Hettinger County $160,616. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-15. High-priority locations that received a project are shown in Figure 4-16. These locations are described in further detail in Appendix: Hettinger County, along with priority rankings and suggested project sheets.

TABLE 4-15
Hettinger County Project Costs

Project Type	Cost
Intersections	$59,520
Roadway Segments	$82,345
Curves	$18,752
Total	**$160,616**

Two roadway segments identified as high-priority locations did not receive projects. These segments are predominately located within the city limits of New England and are urban designed roadways where rural projects would not apply. The portions of these roadway segments outside of city jurisdiction were too short to be considered for corridor projects (Table 4-16).

TABLE 4-16
Hettinger County Priority Roadway Segment Locations without Suggested Treatments

Segment ID	Local Name	Segment Start	Segment End	Location Notes
509.02	12th Street	Main Street	ND 22	Short segment – removed from consideration
509.01	Main Street	ND 21	W 12th Street	Short segment – removed from consideration

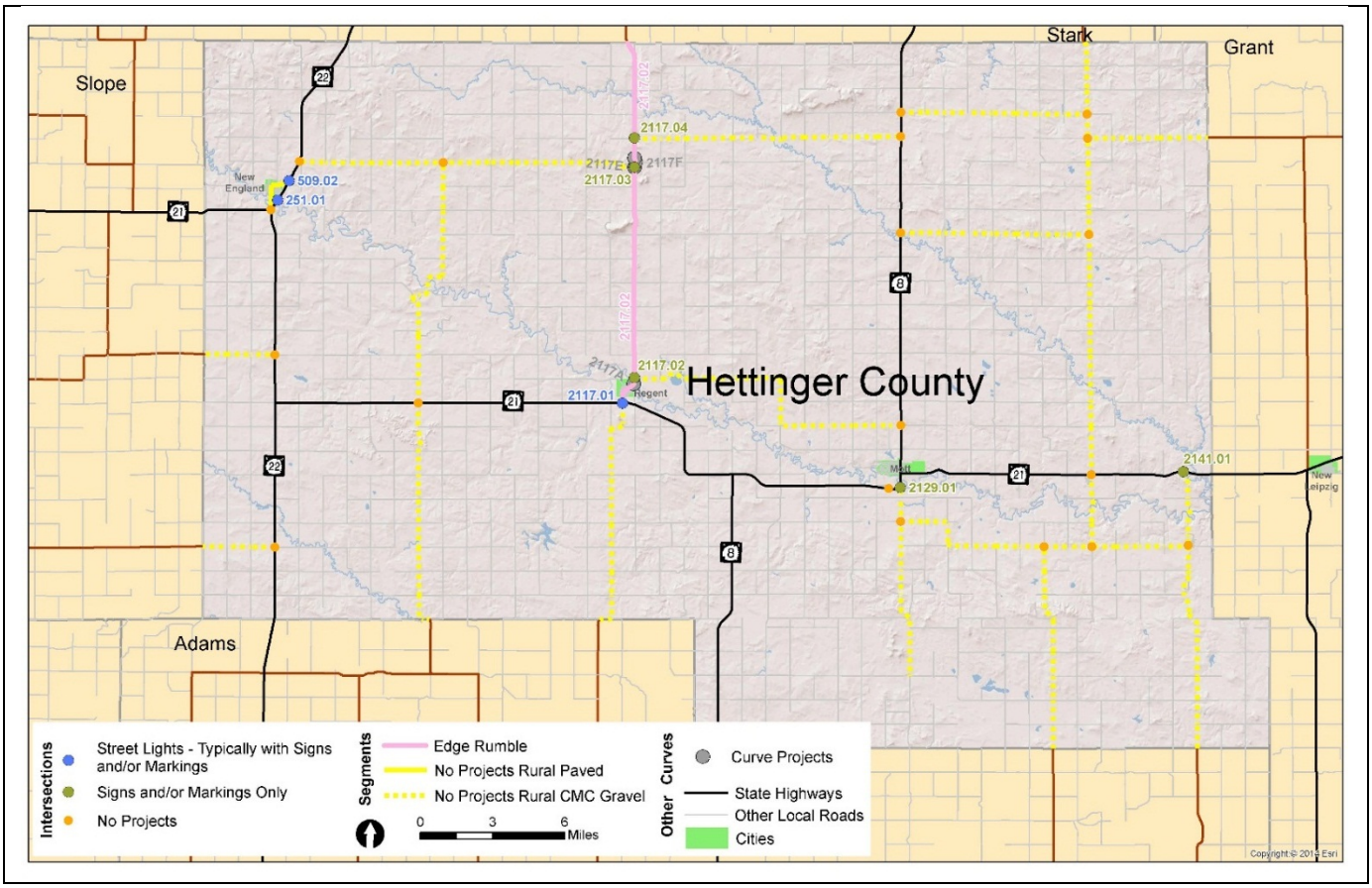


FIGURE 4-16
Hettinger County Project Locations Map

McKenzie County

The total project cost suggested for McKenzie County $946,120. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-17. High-priority locations that received a project are shown in Figure 4-17. These locations are described in further detail in Appendix: McKenzie County, along with priority rankings and suggested project sheets.

TABLE 4-17
McKenzie County Project Costs

Project Type	Cost
Intersections	$647,760
Roadway Segments	$187,125
Curves	$111,235
Total	**$946,120**

Five roadway segments that were identified as high-priority locations did not receive projects. These roadway segments were recently reconstructed; therefore, no projects were suggested since these new treatments reduce lane departure crashes (Table 4-18). In addition, three paved roadway segments had more than one severe crash, but were not high in the priority ranking. These roadway segments did not receive projects because these corridors were recently reconstructed with safety countermeasures.

TABLE 4-18
McKenzie County Priority Roadway Segment Locations without Suggested Treatments

Segment ID	Local Name	Segment Start	Segment End	Location Notes
14.01	106th Avenue NW/106.5 Avenue NW/ 31st Street NW/107th Avenue NW/ 32nd Street NW	ND 23	ND 73	Reconstructed using new design standards, edge and centerline rumbles
30.02	19th Street NW/130th Avenue NW/ 20th Street NW/134th Avenue NW/ 23rd Street NW	136th Avenue NW (McKenzie 27) (N)	ND 200	Reconstructed using new design standards, edge and centerline rumbles
10.01	39th Street NW/40th Street NW	ND 1806	ND 23	Reconstructed using new design standards, edge and centerline rumbles
16.01	156th Avenue NW/34th Street NW/ 35th Street NW/148th Avenue NW/ 147th Avenue NW/146th Avenue NW/ 38th Street NW/39th Street NW/ 155th Avenue NW	30.5 Street NW	US 85	Reconstructed using new design standards, edge and centerline rumbles
53.01	Bear Den Road/21st Street NW/ 109.5 Avenue NW/23rd Street NW/ 110th Avenue NW	ND 73	End Pavement	Reconstructed using new design standards, edge and centerline rumbles

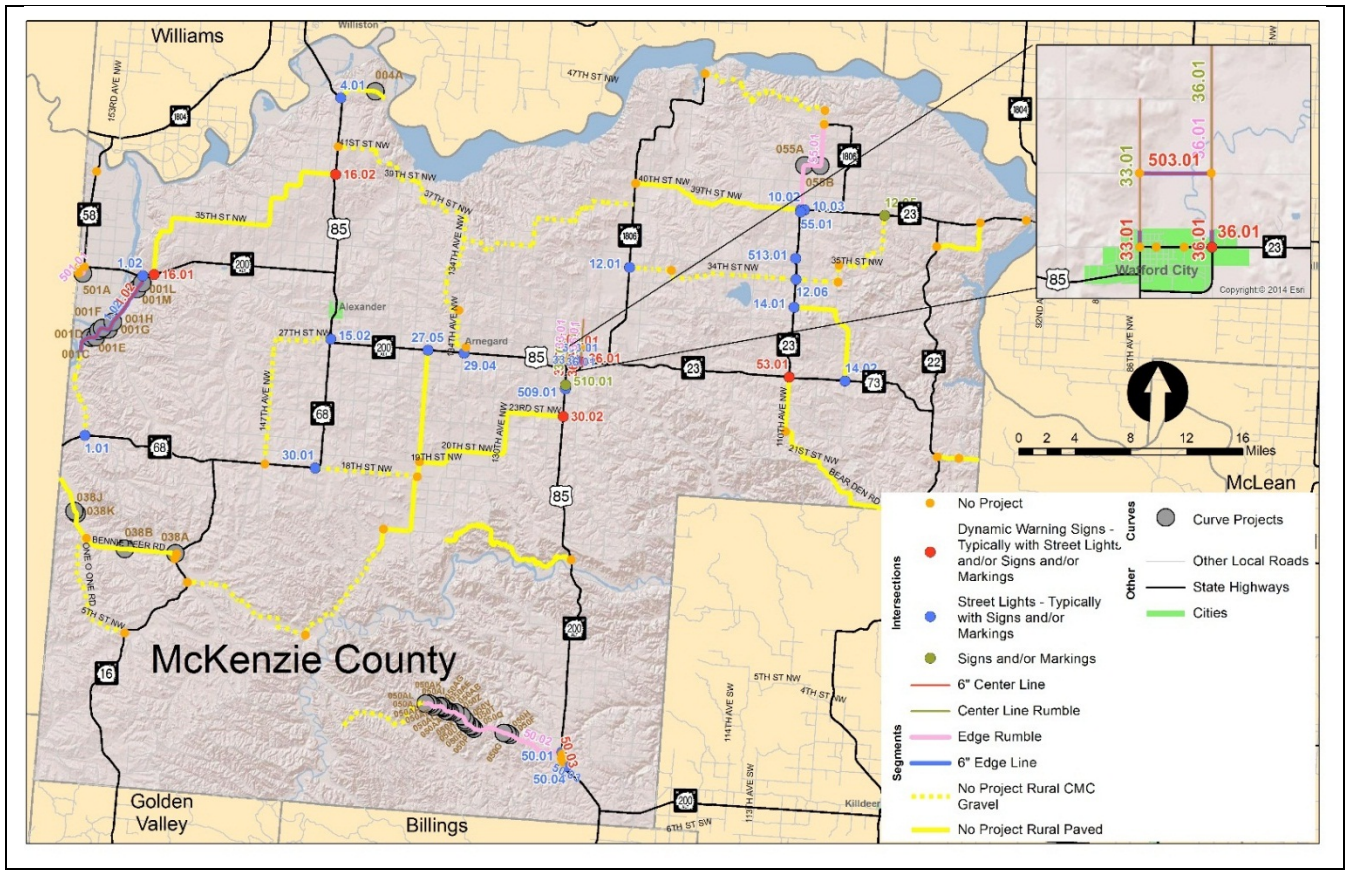


FIGURE 4-17
McKenzie County Project Locations Map

McLean County

The total project cost suggested for McLean County $3,675,343. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-19. High-priority locations that received a project are shown in Figure 4-18. These locations are described in further detail in Appendix: McLean County, along with priority rankings and suggested project sheets.

TABLE 4-19
McLean County Project Costs

Project Type	Cost
Intersections	$3,485,940
Roadway Segments	$140,181
Curves	$49,221
Total	**$3,675,343**

Four intersections and one roadway segment (Tables 4-20 and 4-21) identified as high-priority locations did not receive projects. Three of these intersections are located within city limits and were removed from project consideration. The remaining intersection is yield-controlled.

TABLE 4-20
McLean County Priority Intersection Locations without Suggested Treatments

Intersection ID	Description	Location Notes
15.04	Central Avenue NW & Trooper Avenue (McLean 15)	Within city limits of Garrison – removed from consideration
33.02	W Wing Street (McLean 33) & Main Street	Within city limits of Mercer – removed from consideration
33.03	McLean 33 & 4th Avenue NW (McLean 35)	Yield-controlled – removed from consideration
2.07	Carvell Street & 3rd Avenue SE	Within city limits of Max – removed from consideration

TABLE 4-21
McLean County Priority Roadway Segment Locations without Suggested Treatments

Segment ID	Local Name	Segment Start	Segment End	Location Notes
27.02	Roosevelt Street	South Avenue (ND 41)	McLean 12	Short segment – removed from consideration

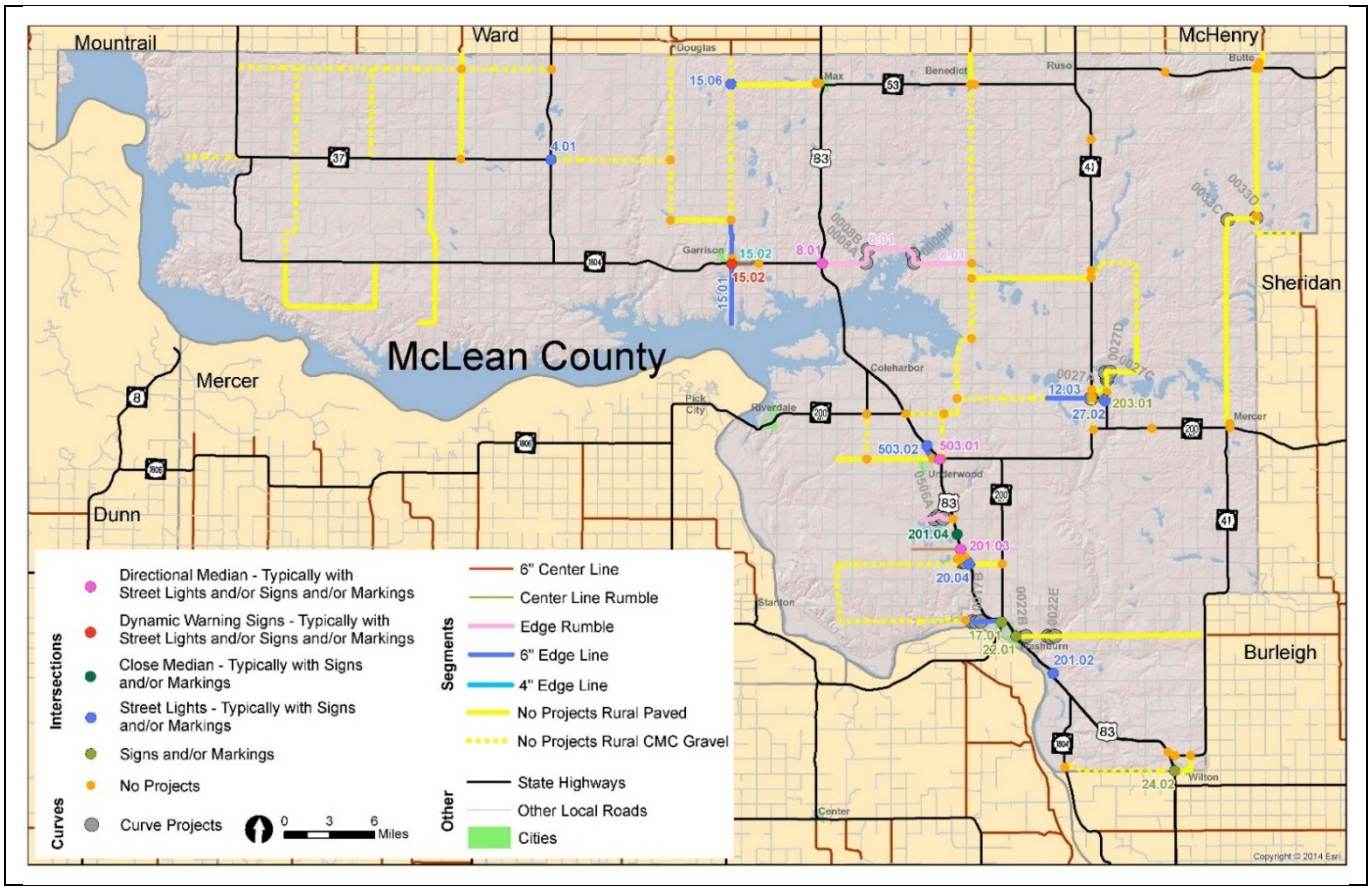


FIGURE 4-18
McLean County Project Locations Map

Mercer County

The total project cost suggested for Mercer County $786,386. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-22. High-priority locations that received a project are shown in Figure 4-19. These locations are described in further detail in Appendix: Mercer County, along with priority rankings and suggested project sheets.

TABLE 4-22
Mercer County Project Costs

Project Type	Cost
Intersections	$300,720
Roadway Segments	$366,048
Curves	$119,618
Total	**$786,386**

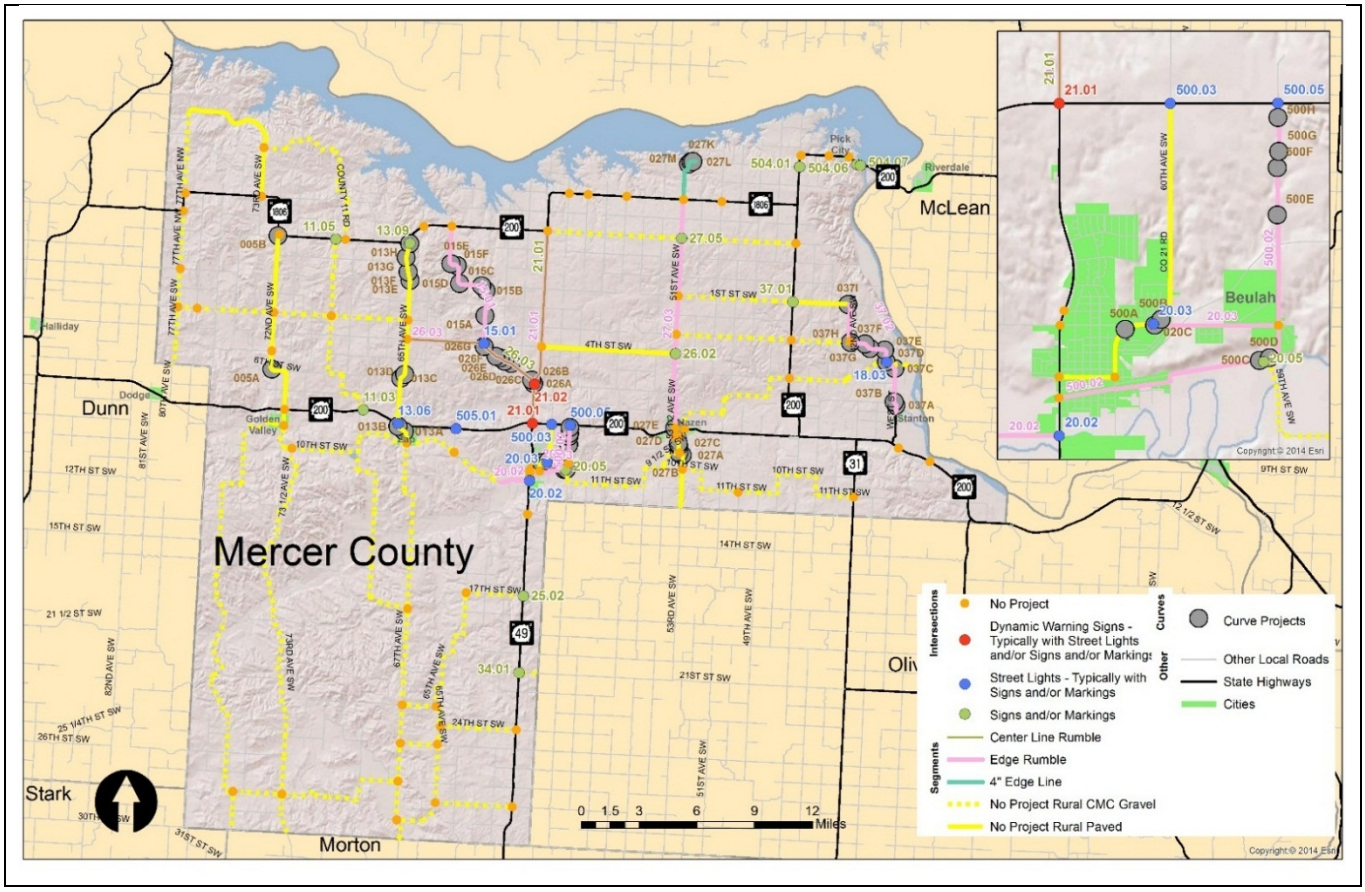


FIGURE 4-19
Mercer County Project Locations Map

Mountrail County

The total project cost suggested for Mountrail County $2,755,005. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-23. High-priority locations that received a project are shown in Figure 4-20. These locations are described in further detail in Appendix: Mountrail County, along with priority rankings and suggested project sheets.

TABLE 4-23
Mountrail County Project Costs

Project Type	Cost
Intersections	$2,679,780
Roadway Segments	$51,084
Curves	$24,141
Total	**$2,755,005**

One roadway segment identified as a high-priority location did not receive projects (Table 4-24). Part of this segment is located within the city limits of Carson and is an urban designed roadway where rural projects would not apply. The remaining portion of the roadway segment was too short to be considered for a corridor project.

TABLE 4-24
Mountrail County Priority Roadway Segment Locations without Suggested Treatments

Segment ID	Local Name	Segment Start	Segment End	Location Notes
521.01	62nd Street NW	US 2	Main Street N	Short segment – removed from consideration

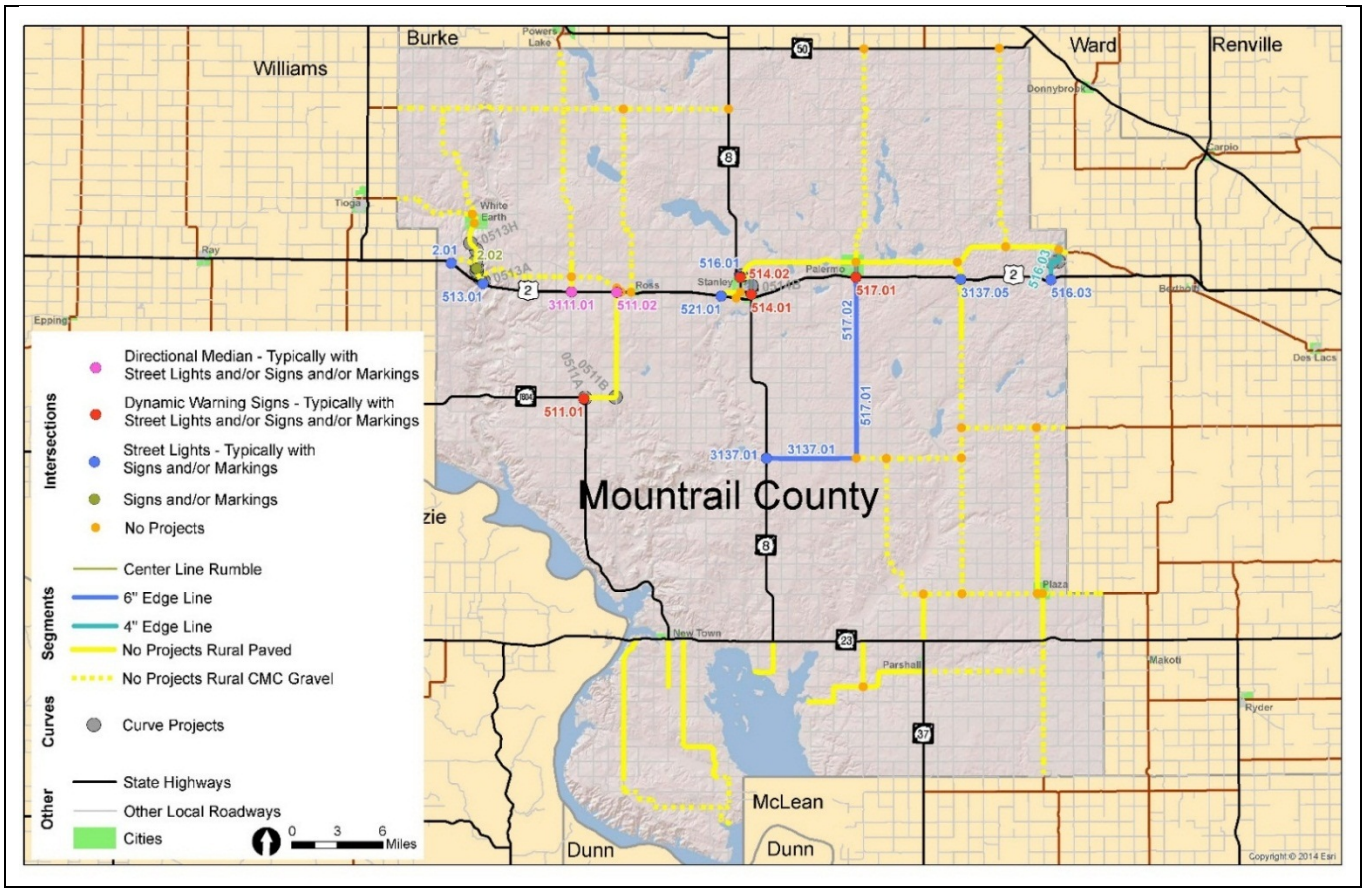


FIGURE 4-20
Mountrail County Project Locations Map

Renville County

The total project cost suggested for Renville County $366,867. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-25. High-priority locations that received a project are shown in Figure 4-21. These locations are described in further detail in Appendix: Renville County, along with priority rankings and suggested project sheets.

TABLE 4-25
Renville County Project Costs

Project Type	Cost
Intersections	$65,880
Roadway Segments	$163,800
Curves	$137,187
Total	**$366,867**

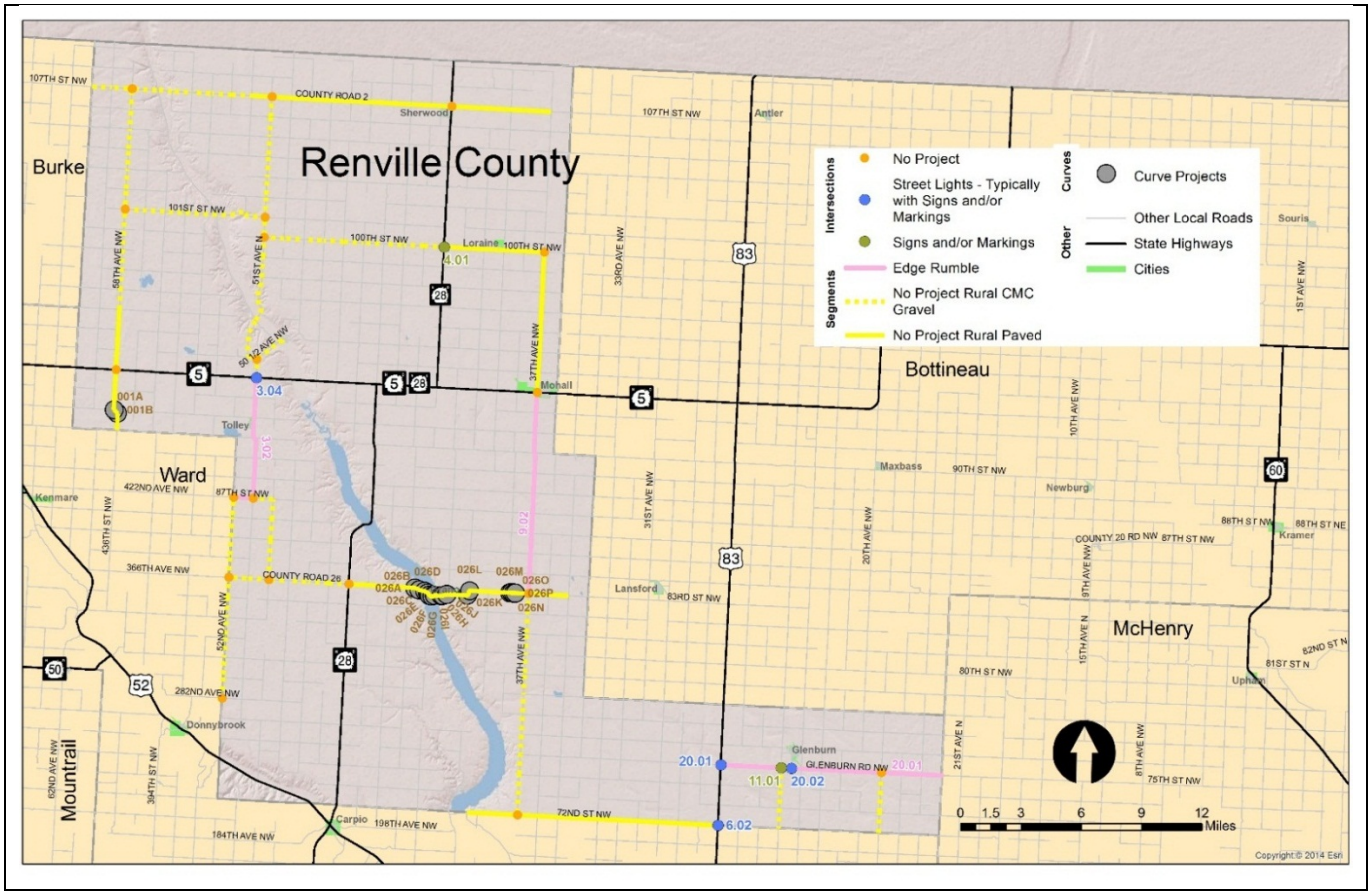


FIGURE 4-21
Renville County Project Locations Map

Slope County

The total project cost suggested for Slope County $60,912. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-26. High-priority locations that received a project are shown in Figure 4-22. These locations are described in further detail in Appendix: Slope County, along with priority rankings and suggested project sheets.

TABLE 4-26
Slope County Project Costs

Project Type	Cost
Intersections	$31,200
Roadway Segments	$7,605
Curves	$22,107
Total	**$60,912**

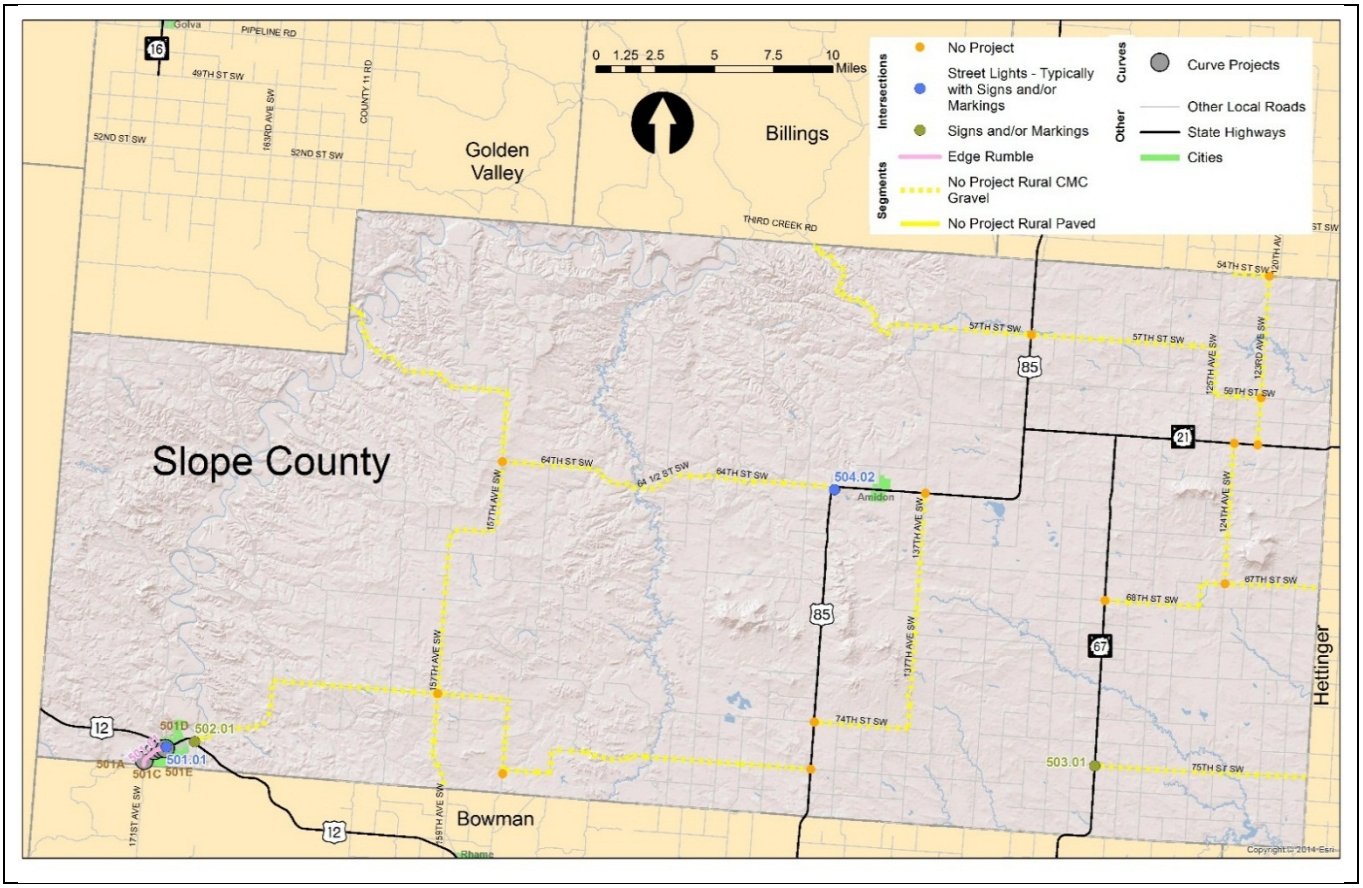


FIGURE 4-22
Slope County Project Locations Map

Stark County

The total project cost suggested for Stark County $937,085. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-27. High-priority locations that received a project are shown in Figure 4-23. These locations are described in further detail in Appendix: Stark County, along with priority rankings and suggested project sheets.

TABLE 4-27
Stark County Project Costs

Project Type	Cost
Intersections	$375,180
Roadway Segments	$504,203
Curves	$57,701
Total	**$937,085**

One intersection identified as a high-priority location did not receive projects. This intersection is yield-controlled and was removed from consideration (Table 4-28).

TABLE 4-28
Stark County Priority Intersection Locations without Suggested Treatments

Intersection ID	Description	Location Notes
222.09	15th Street SE & Main Street	Yield-controlled – removed from consideration

One roadway segment identified as a high-priority location did not receive projects. Half of this segment is located within the city limits of Belfield and is an urban designed roadway where rural projects would not apply. The remaining portion of the roadway segment was too short to be considered for a corridor project (Table 4-29).

TABLE 4-29
Stark County Priority Roadway Segment Locations without Suggested Treatments

Segment ID	Local Name	Segment Start	Segment End	Location Notes
508.01	35th Street SW	132nd Avenue SW (west border of Stark)	US 85	Short segment – removed from consideration

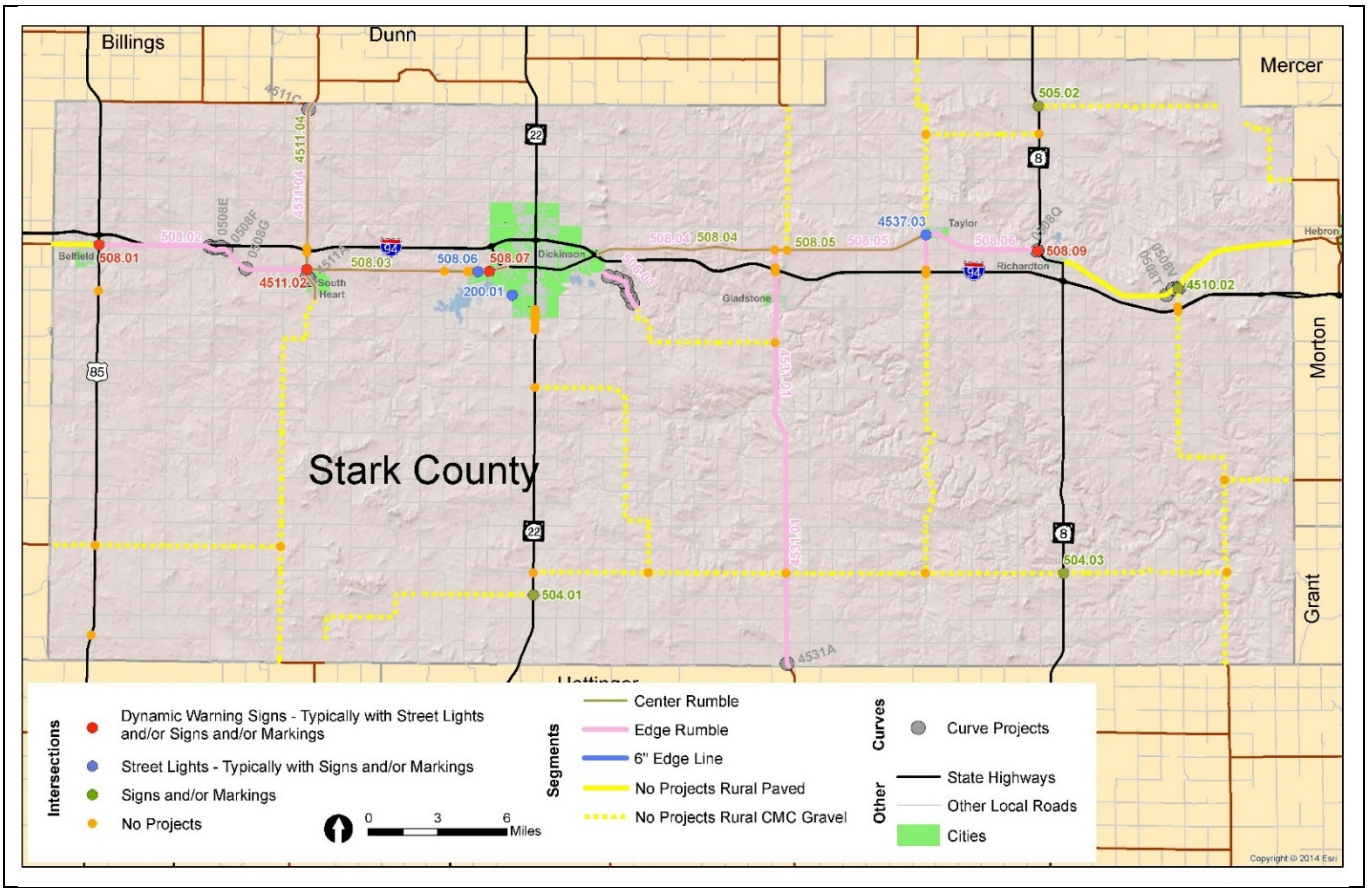


FIGURE 4-23
Stark County Project Locations Map

City of Dickinson

The total project cost suggested for City of Dickinson is $1,199,067. The project cost breakout for roadway segment, right-angle intersection, and pedestrian/bicyclist intersection projects are listed in Table 4-30. High-priority locations that received a project are shown in Figure 4-24. These locations are described in further detail in Appendix: City of Dickinson, along with priority rankings and suggested project sheets.

TABLE 4-30
City of Dickinson Project Costs

Project Type	Cost
Roadway Segments	$632,667
Right-Angle Intersections	$8,400
Pedestrian and Bicyclist Intersections	$558,000
Total	**$1,199,067**

Eight roadway segments in Table 4-31 were identified as high-priority locations and did not receive projects. Three of these segments had the recommended treatment already in place, three corridors had inadequate roadway width in order to implement the recommended treatment, one had the recommended treatment in place along the portion of the roadway where it was feasible, and the remaining roadway segment was a rural design where urban project suggestions were not applicable.

TABLE 4-31
City of Dickinson Priority Roadway Segment Locations without Suggested Treatments

Segment ID	Local Name	Segment Start	Segment End	Location Notes
22.02	S Main Avenue	8th Street SW	I-94 Business Loop	Portion is existing three-lane section, remaining section is too narrow
22.03	3rd Avenue W	I-94 Business Loop	I-94	Existing three-lane section
815.01	State Avenue	8th Street SW	I-94 Business Loop	Existing roadway too narrow
22.04	3rd Avenue W	I-94	33rd Street SW	Existing five-lane section
815.02	State Avenue	I-94 Business Loop	I-94	Existing three-lane section
828.01	10th Avenue E/ Livestock Lane	38th Street SW	Broadway East	Rural design – urban projects not applicable
837.01	Frontage Road	10th Avenue W	Dead end	Existing roadway too narrow
800.01	8th Street SW	State Avenue	ND 22	Existing roadway too narrow

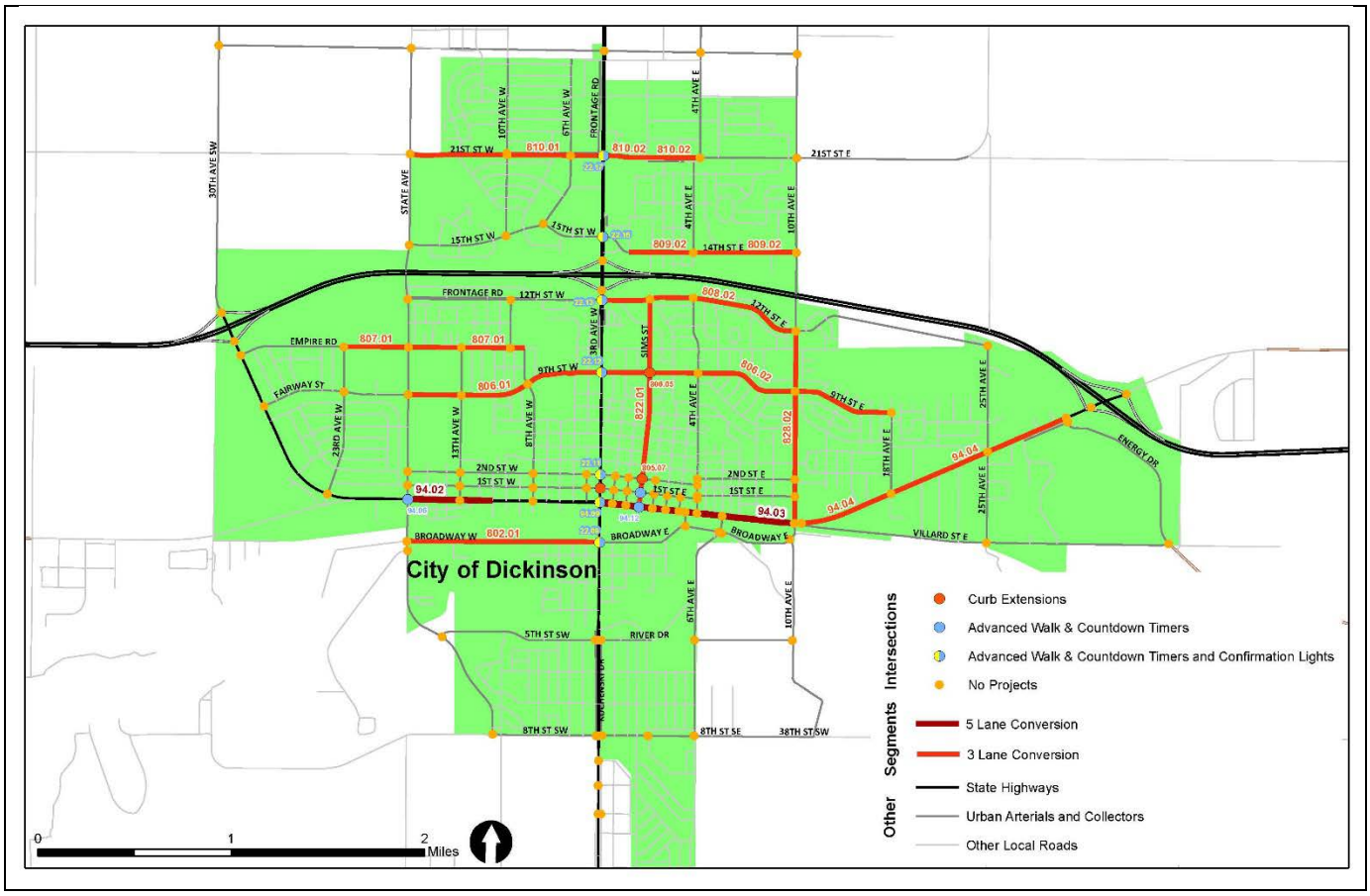


FIGURE 4-24
City of Dickinson Urban Roadway Segment, Right-Angle, and Bicycle/Pedestrian Project Locations Map

Williams County

The total project cost suggested for Williams County $2,148,372. The project cost breakout for intersection, roadway segment, and curve projects are listed in Table 4-32. High-priority locations that received a project are shown in Figure 4-25. These locations are described in further detail in Appendix: Williams County, along with priority rankings and suggested project sheets.

TABLE 4-32
Williams County Project Costs

Project Type	Cost
Intersections	$1,626,780
Roadway Segments	$316,395
Curves	$205,197
Total	**$2,148,372**

Five paved roadway segments had more than one severe crash, but were not high in the priority ranking. These segments did not receive projects because there were no patterns in crashes or projects identified at intersections or curves that could be mitigated with safety countermeasures.

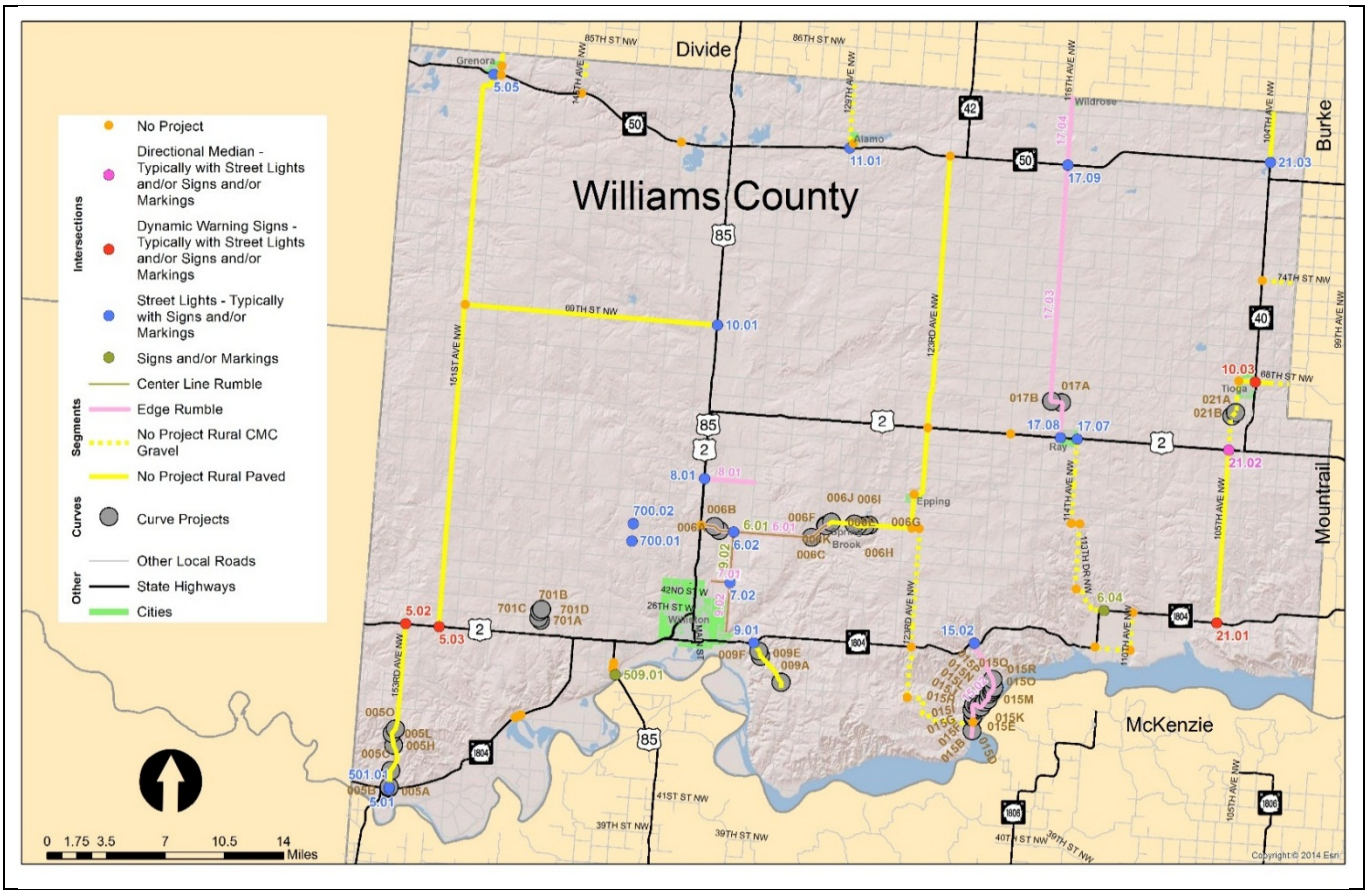


FIGURE 4-25
Williams County Project Locations Map

City of Williston

The total project cost suggested for City of Williston is $1,040,760. The project cost breakout for roadway segment, right-angle intersection, and pedestrian/bicyclist intersection projects are listed in Table 4-33. High-priority locations that received a project are shown in Figures 4-26 and 4-27. These locations are described in further detail in Appendix: City of Williston, along with priority rankings and suggested project sheets.

TABLE 4-33
City of Williston Project Costs

Project Type	Cost
Roadway Segments	$596,160
Right-Angle Intersections	$6,000
Pedestrian and Bicyclist Intersections	$438,600
Total	**$1,040,760**

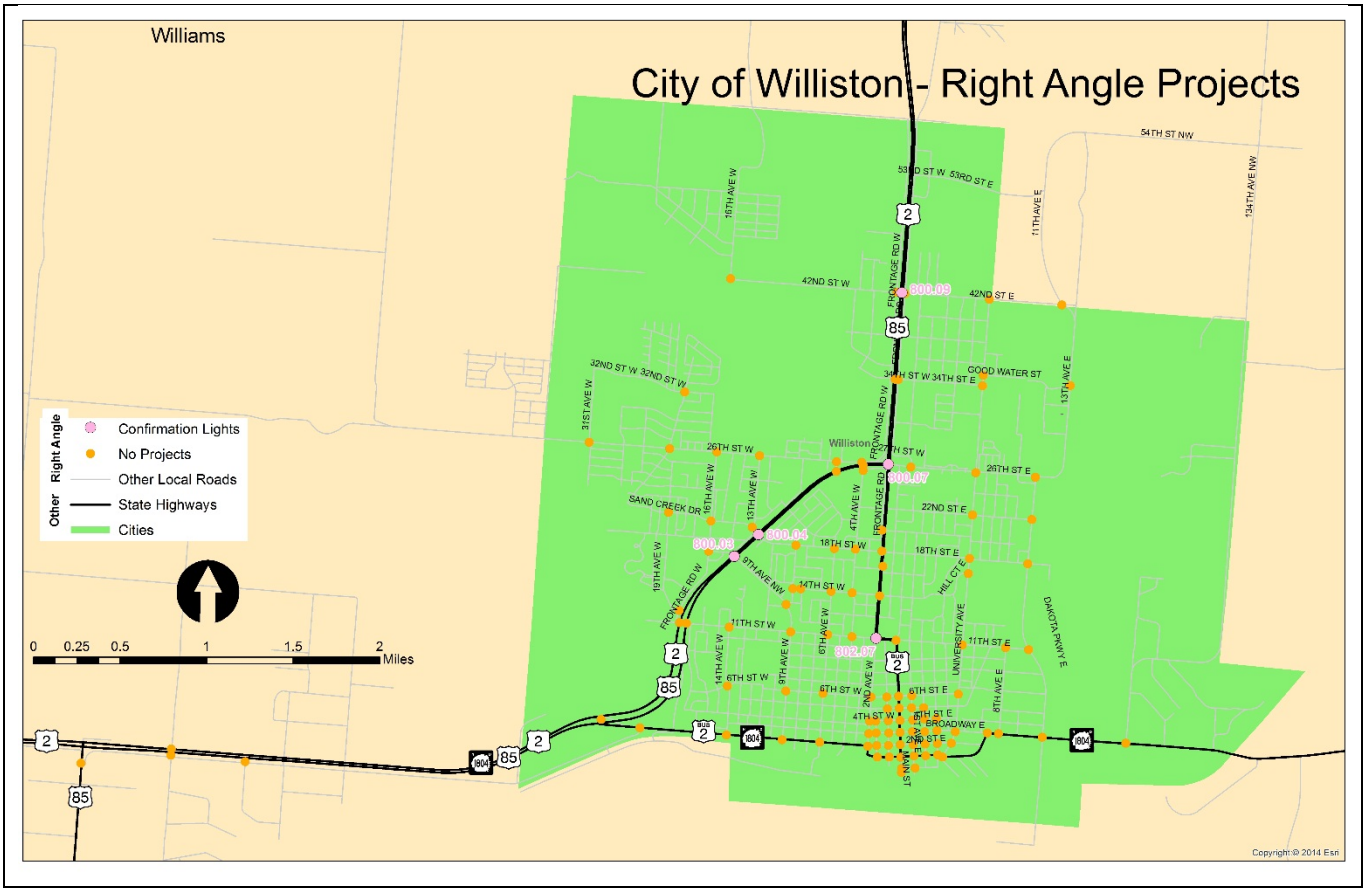


FIGURE 4-26
City of Williston Urban Right-Angle Intersection Project Locations Map

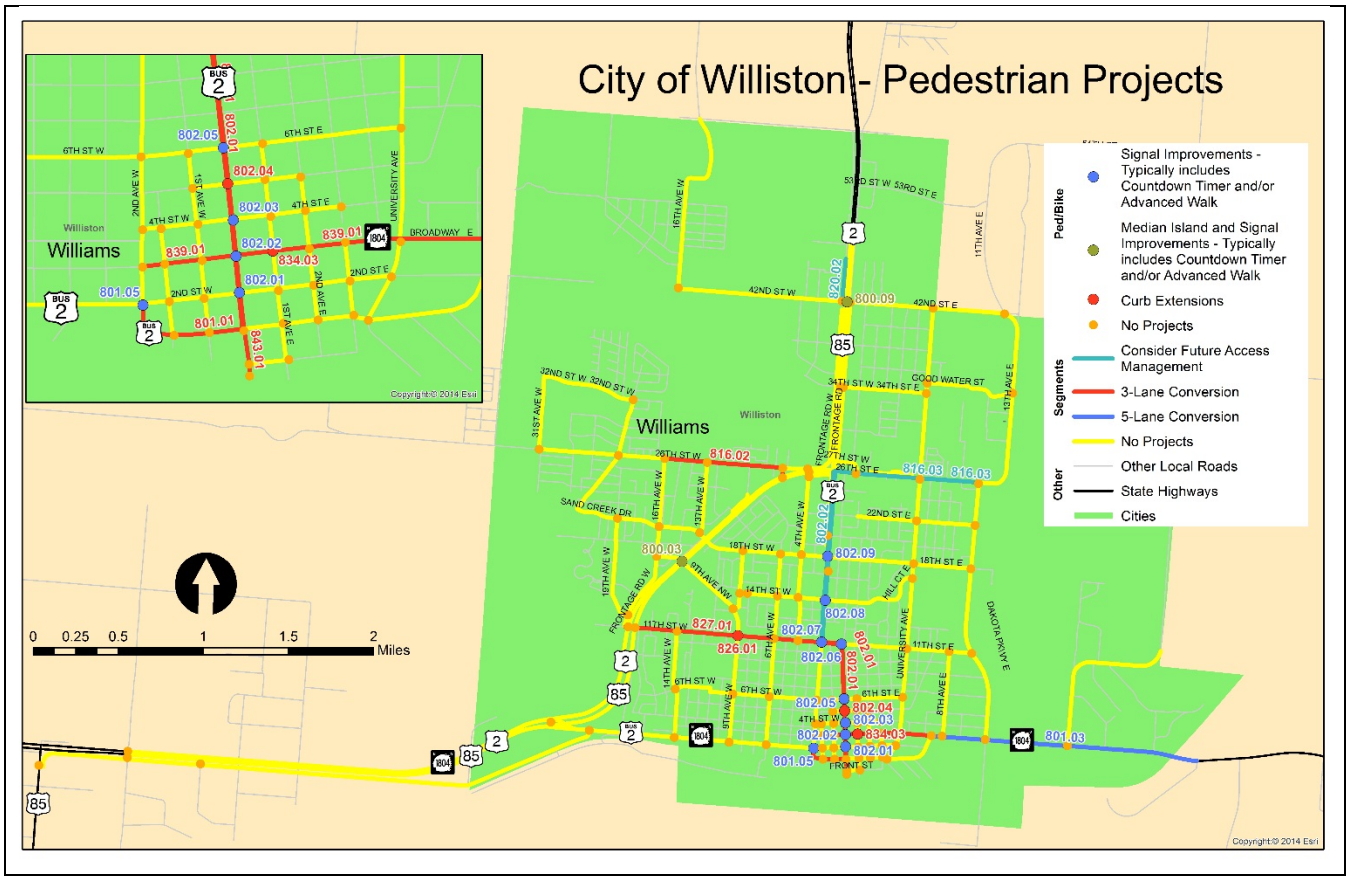


FIGURE 4-27
City of Williston Urban Roadway Segment and Pedestrian/Bicyclist Intersection Project Locations Map

Theodore Roosevelt National Park

The total project cost suggested for Theodore Roosevelt National Park is $139,020. The project cost breakout for intersection, roadway segment, and curve intersection projects are listed in Table 4-34. High-priority locations that received a project are shown in Figures 4-28 and 4-29. These locations are described in further detail in Appendix: Theodore Roosevelt National Park, along with priority rankings and suggested project sheets.

Because Theodore Roosevelt National Park has a unique preservation mission, some of the typical low-cost systemic countermeasures do not fit within the park's context. Therefore, additional low-cost systemic countermeasures were identified that the park may be able to deploy. For the following countermeasures, no specific projects are included in the park's appendix, but staff from Theodore Roosevelt National Park can pursue these project types with the assistance of either Federal Lands Highway or the NDDOT, as appropriate.

- Apply retroreflective tabs to existing guard rails
- Review and remove or replace existing signs (including object markers, speed limit signs, etc.)
- Trim vegetation along curves and in areas with sight distance issues
- Review and apply edge line markings to scenic overlooks
- Install Safety Edge^{SM} on pavement

TABLE 4-34
Theodore Roosevelt National Park Project Costs

Project Type	Cost
Intersections	$13,320
Roadway Segments	$125,700
Curves	$0
Total	**$139,020**

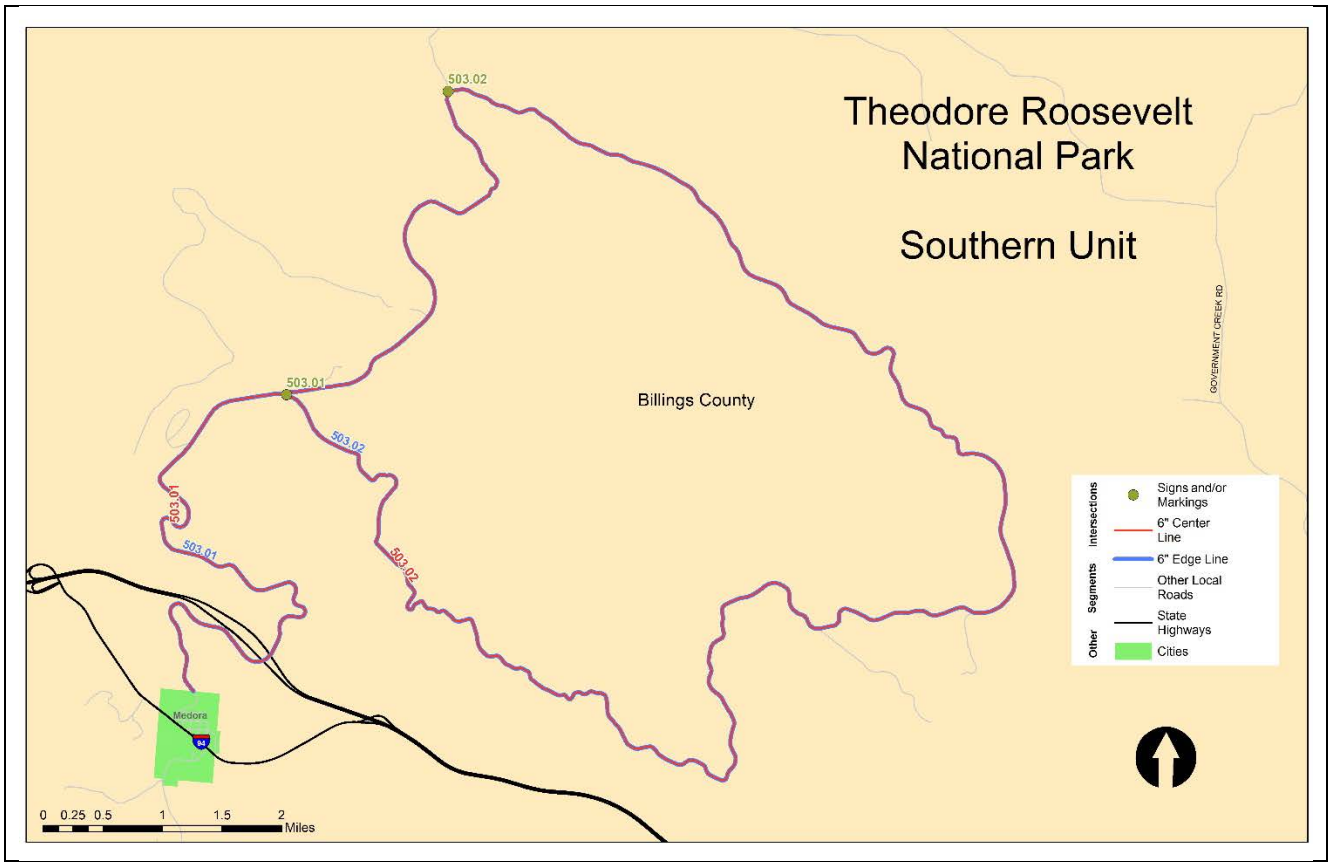


FIGURE 4-28
Theodore Roosevelt National Park South Loop Rural Project Locations Map

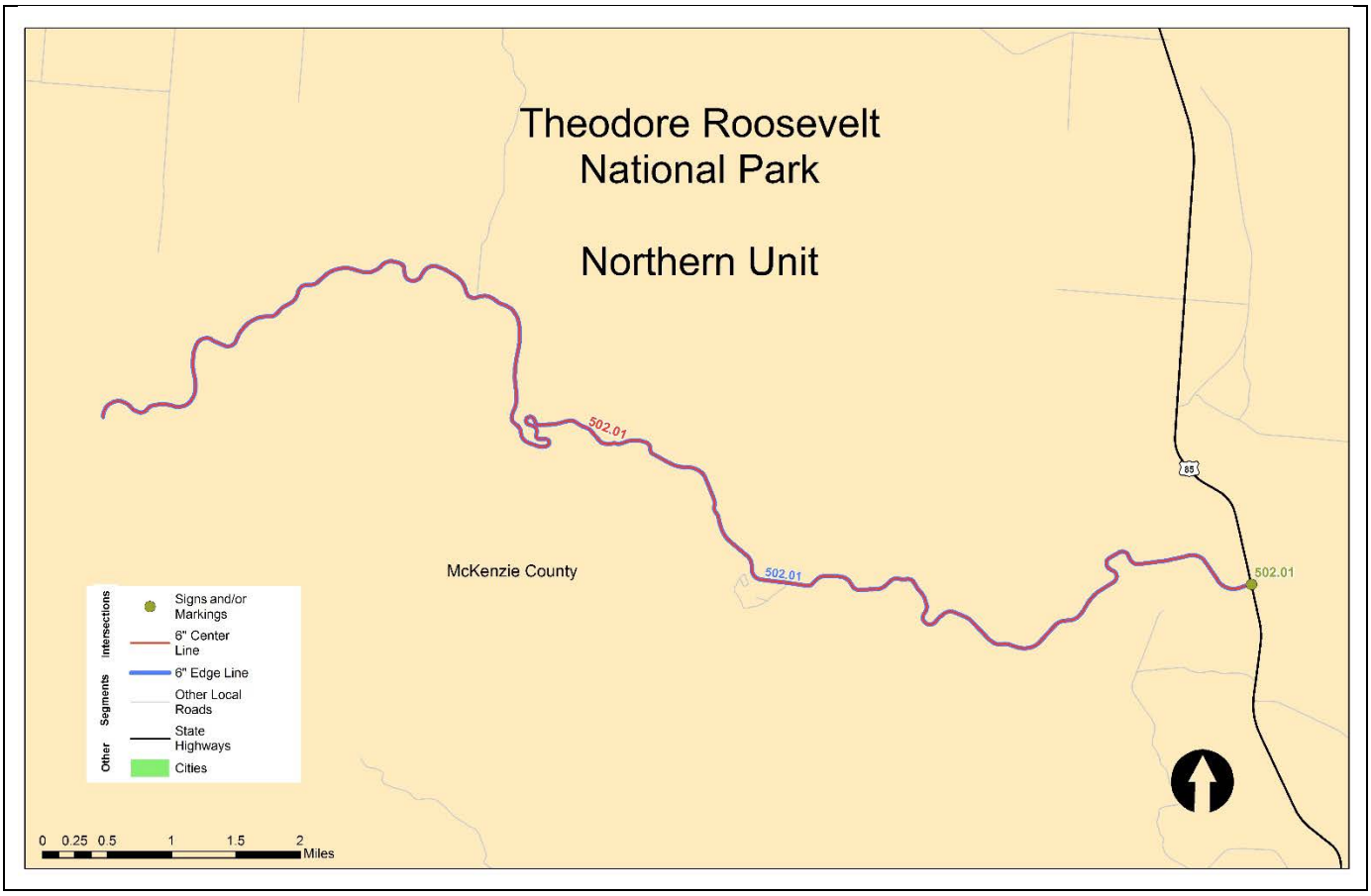


FIGURE 4-29
Theodore Roosevelt National Park North Loop Rural Project Locations Map

APPENDIX

Adams County

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APPENDIX

Billings County

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Bowman County

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Burke County

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Divide County

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Dunn County

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Golden Valley County

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Grant County

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APPENDIX

Hettinger County

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APPENDIX

McKenzie County

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APPENDIX

McLean County

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APPENDIX

Mercer County

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APPENDIX

Mountrail County

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APPENDIX

Renville County

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APPENDIX

Slope County

Golva
PIPELINE RD
16
49TH ST SW
163RD AVE SW
COUNTY 11 RD
52ND ST SW
52ND ST SW
Golden Valley
Billings
0 1.25 2.5 5 7.5 10 Miles
THIRD CREEK RD
Intersections
No Project
Street Lights - Typically with Signs and/or Markings
Signs and/or Markings
Segments
Edge Rumble
No Project Rural CMC Gravel
No Project Rural Paved
Curves
Curve Projects
Other
Other Local Roads
State Highways
Cities
54TH ST SW
120TH AV
57TH ST SW
57TH ST SW
85
125TH AVE SW
123RD AVE SW
59TH ST SW
21
Slope County
64TH ST SW
64 1/2 ST SW
64TH ST SW
504.02
Amidon
157TH AVE SW
137TH AVE SW
124TH AVE SW
67TH ST SW
68TH ST SW
85
67
Hettinger
74TH ST SW
137TH AVE SW
503.01
75TH ST SW
12
501D
502.01
501.01
501A
501C
501E
171ST AVE SW
159TH AVE SW
12
Bowman
Rhame
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Slope County
Rural Segment Projects

Page	Corridor ID	Route #	Start	End	Length	Risk Ranking	4" Edge Line	6" Edge Lines	Edge Rumble Strip	Center Line Rumble	6" Center Line	Project Cost ($)
1	501.01	No designation	Slope/Bowman County Line	US 12/1st St (Marmarth)	1.3	★★★	0.0	0.0	1.3	0.0	0.0	$7,605.00
23 USC 409 NDDOT Reserves All Objections					**1.3**		**0.0**	**0.0**	**1.3**	**0.0**	**0.0**	**$ 7,605.00**

Slope County
Rural Segment Listing

23 USC 409
NDDOT Reserves All Objections

*High Priority Segments Project Sheet Page Number

Project Sheet Page*	Corridor	Route	Start	End	Length (miles)	Lane Departure Crashes	ADT	Lane Departure Density	Access Density	Curves w/ Critical Radius / Mile	Edge Risk Assesment
1	501.01	No designation	Slope/Bowman County Line	US 12/1st St (Marmarth)	1.3	1	345	0.15	8.2	0.00	3
					1.3	1					

Edge Risk Legend

3 -- Risky' - NEITHER shoulder or good clear zone
2 -- Either a shoulder OR good clear zone
1 -- BOTH shoulder and a good clear zone

Critical ADT Range - Lane Departure

Min	450
Max	1,000,000

	Access	Lane Departure	Critical Radius Curves
Total	0	1	0
Total Mileage	1.3	1.3	1.3
Years		5	
Average Density (Total/Mile)	**0.0**	**0.15**	**0.00**

Slope County
Rural Segment Prioritization - Lane Departure Priority

23 USC 409
NDDOT Reserves All Objections

#	Corridor	Route	Start	End	Length	ADT	ADT Range	Lane Departure Density	Access Density	Curve Critical Radius Density	Edge Risk	Totals	Tiebreakers: Edge Risk	Tiebreakers: ADT
1	501.01	No designation	Slope/Bowman County Line	US 12/1st St (Marmarth)	1.3	345		★	★		★	★★★	3	345
						Total Stars --	0	1	1	0	1			
						% That Gets Star --	0%	100%	100%	0%	100%			

	#	%	Mileage %
★★★★★	0	0%	0%
★★★★	0	0%	0%
★★★	1	100%	100%
★★	0	0%	0%
★	0	0%	0%
	0	0%	0%
	1	100%	100%

	Stars
ADT Range -	If segment has an ADT in the range of most at-risk ADT based on statewide totals. (450 < ADT < 1000000)
Lane Departure Density -	If segment has higher lane departure density greater than the statewide average (0.065).
Access Density	If segment has access density greater than statewide overrepresentation threshold (6/mi).
Curve Critical Radius Density -	If segment has higher density of curves with critical radius than the Western average (0.253).
Edge Risk Assessment -	Edge risk of 2 or 3, based on assessment of roadway edge and clear zone.

HIGHWAY SAFETY IMPROVEMENT PROGRAM (HSIP) PROJECT APPLICATION

North Dakota Department of Transportation Programming
SFN 59959 (06-2011)

Camp Crook Rd from Slope/Bowman County Line to US 12/1st St (Marmarth)

Agency Name: Slope County | **ND DOT District: 5**
Contact Name: Dale Powell | **Telephone Number: 701-879-6276**
Email Address: djpowell@nd.gov

Please attach a location map(s). You may use additional sheets to further describe your project.

Location Description

Start:	Slope/Bowman County Line	*Lane Width:*	11'
End:	US 12/1st St (Marmarth)	*Speed Limit:*	Low
Facility Type:	2-Lane	*Shoulder Width:*	1'
ADT:	345	*Shoulder Type:*	Paved
Road Type	Paved	*Length (miles):*	1.3
Terrain:	Not	*Rumble Installed:*	No
County Road:	No designation	*Oil Project:*	No
Local Name:	Camp Crook Rd		

SHSP Emphasis Area (check all that apply)

- ☐ Reduce Alcohol Impaired Driving
- ☐ Increase the Use of Safety Restraints for all Occupants
- ☐ Younger Driver/Older Driver Safety
- ☐ Curb Aggressive Driving
- ☑ Improvements to Address Lane Departure Crashes
- ☐ Enhancing EMS Capabilities to Increase Survivability
- ☐ Improve Intersection Safety

Describe Current Safety Issues & Systemic Ranking Review

North Dakota Crashes, 2009 - 2013 — 5 years

	Total	Road Dept	K+A
Crashes	1	1	0
Density (per mile per year)	0.15	0.15	0.00
Rate (per MVM)	1.22	1.22	0.00

	Value	Critical	Departure
ADT Range	345	450≤ADT≤1000000	
RD Density	0.149	0.065	★
Access Density	8.2	6.0	★
Curve Critical Radius Density	0.000	0.253	
Edge Risk	3	2 or 3	★
			★★★

Describe Proposed Safety Improvements

Description	Type	Cost per mi	Mileage	Cost
4" Edge Lines	Proactive	$1,320	0.0	$0
6" Edge Lines	Proactive	$1,980	0.0	$0
Edge Rumble Strip	Proactive	$5,850	1.3	$7,605
Ground In Wet-Reflective Markings	Proactive	$36,000	0.0	$0
Center Line Rumble Strip	Proactive	$3,600	0.0	$0
6" Center Line	Proactive	$1,020	0.0	$0

Notes - Edgeline rumble with 6" edgeline markings. Dependent on future paving project. Curve and intersection projects suggested on other sheets.

Project Cost Estimate (attach detailed copy)

Federal Funds	$6,845
Local Match (10% of Total project cost)	$761
Total Project Cost	**$7,605**

Proposed Year of Construction

NDDOT Central Office Only

Project Accepted?	☐ Yes ☐ No	Reference Number		ID Number	

Notes

23 USC 409
NDDOT Reserves All Objections

Slope County
Curve Projects

Page	Corridor ID	# of Curves	Route #	Start	End	Chevron	Arrow Board	Shoulder Paving	Edge Rumble Strips	Advanced Sign/Speed Plaque	Project Cost ($)
1	501.01	5	No designation	Slope/Bowman County Line	US 12/1st St (Marmarth)	$ 15,840	$ -	$ -	$ 4,827	$ 1,440	$ 22,107
23 USC 409 NDDOT Reserves All Objections						**$ 15,840**	**$ -**	**$ -**	**$ 4,827**	**$ 1,440**	**$ 22,107**

Slope County Curves

Curve Count	ID	Corridor	Segment	Start	End	Inside Shoulder Type	Outside Shoulder Type	Isolated Curve	Curve Warning Sign	Warning Sign Type	Speed Advisory Sign	Advisory Speed	Arrow Board	Chevrons	Crashes Total	Crashes Total Severe	Radius (ft)	ADT	Intersection on Curve	Visual Trap	Speed Limit	Risk Ranking
1	501A	501.01	No designation	Slope/Bowman County Line	US 12/1st St (Marmarth)	Paved	Paved	No	Yes	Curve Warning	No		No	No	1	-	1540	345	Yes	No	Low	★
2	501B	501.01	No designation	Slope/Bowman County Line	US 12/1st St (Marmarth)	Paved	Paved	No	No		No		No	No	-	-	1720	345	No	No	Low	
3	501C	501.01	No designation	Slope/Bowman County Line	US 12/1st St (Marmarth)	Paved	Paved	No	No		No		No	No	-	-	1235	345	No	No	Low	
4	501D	501.01	No designation	Slope/Bowman County Line	US 12/1st St (Marmarth)	Paved	Paved	No	No		No		No	No	-	-	1510	345	No	No	Low	
5	501E	501.01	No designation	Slope/Bowman County Line	US 12/1st St (Marmarth)	Paved	Paved	No	Yes	Curve Warning	No		No	Yes	-	-	250	345	Yes	No	Low	★
															1	-						

Stars	Total #	Total %	Chevroned (% of Stars)
★★★★★	0	0%	0%
★★★★	0	0%	0%
★★★	0	0%	0%
★★	0	0%	0%
★	2	40%	50%
	3	60%	0%
	5	100%	20%

23 USC 409
NDDOT Reserves All Objections

Critical Ranges	Min	Max
Radius	500	1,200
ADT	450	1,000,000

HIGHWAY SAFETY IMPROVEMENT PROGRAM (HSIP) PROJECT APPLICATION

North Dakota Department of Transportation Programming

SFN 59959 (06-2011)

Curves on Camp Crook Rd from Slope/Bowman County Line to US 12/1st St (Marmarth)

Agency Name: Slope County — **ND DOT District: 5**

Contact Name: Dale Powell — **Telephone Number: 701-879-6276**

Email Address: djpowell@nd.gov

Please attach a location map(s). You may use additional sheets to further describe your project.

Location Description (Corridor Containing Curves)

Start: Slope/Bowman County Line
End: US 12/1st St (Marmarth)
Facility Type: 2-Lane
ADT: 345
Road Type Paved
Terrain: Not
County Road: No designation
Local Name: Camp Crook Rd

Lane Width: 11'
Speed Limit: Low
Shoulder Width: 1'
Shoulder Type: Paved
Length (miles): 1.3
Rumble Installed: No
Edge Line Installed: Yes

SHSP Emphasis Area (check all that apply)

- ☐ Reduce Alcohol Impaired Driving
- ☐ Increase the Use of Safety Restraints for all Occupants
- ☐ Younger Driver/Older Driver Safety
- ☐ Curb Aggressive Driving
- ☑ Improvements to Address Lane Departure Crashes
- ☐ Enhancing EMS Capabilities to Increase Survivability
- ☐ Improve Intersection Safety

Describe Current Safety Issues & Systemic Ranking Review

North Dakota Crashes, 2009 - 2013 — 5 years

Curve ID	Oil Proj	K	A	Radius (ft)	ADT	Intersection on Curve	Visual Trap	Risk Ranking	Proximity	Existing Arrow Board	Existing Chevrons	Critical Radius	Sign Improvement Project	Shoulder Paving Project	Shoulder Rumble Strip Project	Advance Horizontal Alignment Warning Sign	Advisory Speed Plaque
501A	No	0	0	1540	345	Yes	No	★	0	-	-	-	Chevron	-	Inside/Outside	-	-
501B	No	0	0	1720	345	No	No		0	-	-	-	-	-	Inside/Outside	-	-
501C	No	0	0	1235	345	No	No		0	-	-	-	Chevron	-	Inside/Outside	-	-
501D	No	0	0	1510	345	No	No		0	-	-	-	Chevron	-	Inside/Outside	-	-
501E	No	0	0	250	345	Yes	No	★	0	-	x	-	Chevron	-	Inside/Outside	x	Inspect Curve

*Curve numbering not consecutive, as some curves may have been removed from further analysis because a large radius, located on a gravel road, etc

Ranking Criteria

Criteria	
Severe Crashes	> 0
Radius	500 to 1200
ADT	50 to 1000000
Intersection on Curve	Yes
Visual Trap	Yes

Curves are selected for project if:
- 3 or more ★s
- x in Proximity or Existing Chevron column
- within Critical Radius

Describe Proposed Safety Improvements

Description	Type	Unit Cost	Quantity	Total cost
Chevrons	Proactive	$3,960 per curve	4	$15,840
Arrow Board Only	Proactive	$1,200 per curve	0	$0
Advance Warning Sign/Speed Advisory Plaque	Proactive	$1,440 per curve	1	$1,440
Shoulder Rumble Strip	Proactive	$5,850 per mile	.8 miles	$4,827
Shoulder Paving	Proactive	$54,000 per mile	.0 miles	$0
				$22,107

Notes - Segment and intersection projects suggested on other sheets.

Project Cost Estimate (attach detailed copy)

Federal Funds	$19,897
Local Match (10% of Total project cost)	$2,211
Total Project Cost	**$22,107**

Proposed Year of Construction

NDDOT Central Office Only

Project Accepted? ☐ Yes ☐ No — Reference Number — ID Number

Notes

23 USC 409
NDDOT Reserves All Objections

Page: 1
Segment ID: 501.01
Date: 10/31/2014

Slope County
Summary of Rural Intersection Projects

Page	Intersection ID	Description	Risk Ranking	Directional Median	Mainline Dynamic Warning Sign	Close Median	Install Street Lights	Signs & Markings	Project Cost ($)
1	502.01	76th St NW & US 12	★★★★	-	-	-	-	x	$2,040
2	504.02	64th St SW & US 85	★★★★	-	-	-	x	x	$12,240
3	503.01	75th St SW & ND 67	★★★	-	-	-	-	x	$4,080
4	501.01	Camp Crook Rd & US 12	★★★	-	-	-	x	x	$12,840
23 USC 409 NDDOT Reserves All Objections				**0**	**0**	**0**	**2**	**4**	**$31,200**

Slope County
Rural Intersection Listing

23 USC 409
NDDOT Reserves All Objections

Int #	Intersection Description	Skew	On/Near Curve	Development	RR Xing	ADT	Previous STOP (>5mi)	Total Crashes	ADT Cross Product > 80000	Crash Cost
501.01	Camp Crook Rd & US 12	No	Yes	No	No	963	Yes	0	Yes	$ -
502.01	76th St NW & US 12	No	Yes	No	Yes	803	Yes	1	No	$ 12,000
502.04	76th St SW & US 85	No	No	No	No	1845	Yes	0	No	$ -
503.01	75th St SW & ND 67	No	Yes	No	No	275	Yes	1	No	$ 12,000
504.02	64th St SW & US 85	No	Yes	No	No	1830	Yes	1	Yes	$ 12,000
505.01	68th St SW & ND 67	No	No	No	No	160	Yes	0	No	$ -
506.01	57th St SW & US 85	No	No	No	No	1738	Yes	0	No	$ -
508.01	74th St SW & US 85	No	No	No	No	1820	Yes	0	No	$ -
508.02	137th Ave SW & US 85	No	No	No	No	1675	Yes	0	No	$ -
509.02	124th Ave SW & ND 21	No	No	No	No	435	Yes	0	No	$ -
509.03	123rd Ave SW & ND 21	No	No	No	No	503	Yes	0	No	$ -

Slope County
Rural Intersection Prioritization

23 USC 409
NDDOT Reserves All Objections

Rank	Int #	Intersection Description	Skew	On/Near Curve	Development	RR Xing	Previous STOP (>5mi)	Total Crashes	ADT Cross Product > 80000	Priority	Crash Cost
1	502.01	76th St NW & US 12		★		★	★	★		★★★★	$ 12,000
2	504.02	64th St SW & US 85		★			★	★	★	★★★★	$ 12,000
3	503.01	75th St SW & ND 67		★			★	★		★★★	$ 12,000
4	501.01	Camp Crook Rd & US 12		★			★		★	★★★	$ -
5	502.04	76th St SW & US 85					★			★	$ -
6	505.01	68th St SW & ND 67					★			★	$ -
7	506.01	57th St SW & US 85					★			★	$ -
8	508.01	74th St SW & US 85					★			★	$ -
9	508.02	137th Ave SW & US 85					★			★	$ -
10	509.02	124th Ave SW & ND 21					★			★	$ -
11	509.03	123rd Ave SW & ND 21					★			★	$ -
		Total Stars --	0	4	0	1	11	3	2		
		% That Gets Star --	0%	36%	0%	9%	100%	27%	18%		

Totals

	#	%
★★★★★★★	0	0%
★★★★★★	0	0%
★★★★★	0	0%
★★★★	2	18%
★★★	2	18%
★★	0	0%
★	7	64%
-	0	0%
	11	100%

Stars	
Skew -	If intersection is skewed at an angle of 20 degrees or greater.
On/Near Curve -	If intersection is on or within 1,000 feet of curve.
Development -	If intersection aerial shows a commercial development with access near intersection.
RR Xing -	If intersection has a railroad crossing on any approach within 500 feet.
Previous STOP (>5 mi) -	If vehicles approaching the stop control have not had a previous stop along the roadway within 5 miles
Total Crashes -	If intersection has at least 1 crash.
ADT Cross Product -	If intersection has an ADT cross product > 80000

HIGHWAY SAFETY IMPROVEMENT PROGRAM (HSIP) PROJECT APPLICATION

North Dakota Department of Transportation Programming
SFN 59959 (06-2011)

76th St NW & US 12

Agency Name: Slope County | **ND DOT District: 5**
Contact Name: Dale Powell | **Telephone Number: 701-879-6276**
Email Address: djpowell@nd.gov

Please attach a location map(s). You may use additional sheets to further describe your project.

Location Description

Configuration:	T	Traffic Control Device:	Thru-STOP
Configuration (2):	Undivided	Street Lights:	No
Urban/Rural:	Rural	Flashers:	No
County:	Slope	Major Entering ADT:	790
Entering ADT:	803	Minor Entering ADT:	13
Jurisdiction:	State	Oil Project:	No

SHSP Emphasis Area (check all that apply)

- ☐ Reduce Alcohol Impaired Driving
- ☐ Increase the Use of Safety Restraints for all Occupants
- ☐ Younger Driver/Older Driver Safety
- ☐ Curb Aggressive Driving
- ☐ Improvements to Address Lane Departure Crashes
- ☐ Enhancing Emergency Medical Capabilities to Increase Survivability
- ☑ Improve Intersection Safety

Describe Current Safety Issues & Systemic Ranking Review

North Dakota Crashes, 2009 - 2013 — 5 years

	Total	Angle	K+A
Crashes	1	0	0.00
Rate (per MVM)	0.7	0.0	0.0

	Value	Critical	Risk Ranking
Skew	No	Yes	
On/Near Curve	Yes	Yes	★
Development	No	Yes	
Near RR Crossing	Yes	Yes	★
Distance from previous STOP	Yes	Yes	★
Volume Cross Product	No	≥ 80000	
Total Crashes	1	>0	★
			★★★★

Describe Proposed Safety Improvements

Description	Unit Cost		Units	Cost
Roundabout	$4,200,000	per intersection	0	$0.00
Directional Median	$1,080,000	per intersection	0	$0.00
Mainline Dynamic Warning Sign	$60,000	per intersection	0	$0.00
Close Median	$30,000	per intersection	0	$0.00
Installing Street Lights	$10,200	per street light	0	$0.00
Upgrade Stop Sign	$540	per sign	1	$540.00
Upgrade Junction Sign	$540	per sign	1	$540.00
Upgrade Stop Ahead Sign	$600	per sign	1	$600.00
Upgrade Stop Ahead Marking	$600	per marking	0	$0.00
Upgrade Stop Bar	$360	per marking	1	$360.00
Review Signs and CST	$2,940	per intersection	0	$0.00
				$2,040.00

Notes - .

Signs and Markings and Street Light project costs vary by the number of minor legs associated with the intersection.

Project Cost Estimate (attach detailed copy)

Federal Funds	$1,836
Local Match (10% of Total project cost)	$204
Total Project Cost	**$2,040**

Proposed Year of Construction

NDDOT Central Office Only

Project Accepted?	☐ Yes ☐ No	Reference Number		ID Number	

Notes

23 USC 409
NDDOT Reserves All Objections

Intersection ID: 502.01
Date: 10/15/2014

HIGHWAY SAFETY IMPROVEMENT PROGRAM (HSIP) PROJECT APPLICATION

North Dakota Department of Transportation Programming
SFN 59959 (06-2011)

64th St SW & US 85

Agency Name: Slope County **ND DOT District: 5**
Contact Name: Dale Powell **Telephone Number: 701-879-6276**
Email Address: djpowell@nd.gov

Please attach a location map(s). You may use additional sheets to further describe your project.

Location Description

Configuration:	T	Traffic Control Device:	Thru-STOP
Configuration (2):	Undivided	Street Lights:	No
Urban/Rural:	Rural	Flashers:	No
County:	Slope	Major Entering ADT:	1770
Entering ADT:	1830	Minor Entering ADT:	60
Jurisdiction:	State	Oil Project:	No

SHSP Emphasis Area (check all that apply)

- ☐ Reduce Alcohol Impaired Driving
- ☐ Increase the Use of Safety Restraints for all Occupants
- ☐ Younger Driver/Older Driver Safety
- ☐ Curb Aggressive Driving
- ☐ Improvements to Address Lane Departure Crashes
- ☐ Enhancing Emergency Medical Capabilities to Increase Survivability
- ☑ Improve Intersection Safety

Describe Current Safety Issues & Systemic Ranking Review

North Dakota Crashes, 2009 - 2013 5 years

	Total	Angle	K+A
Crashes	1	0	0.00
Rate (per MVM)	0.3	0.0	0.0

	Value	Critical	Risk Ranking
Skew	No	Yes	
On/Near Curve	Yes	Yes	★
Development	No	Yes	
Near RR Crossing	No	Yes	
Distance from previous STOP	Yes	Yes	★
Volume Cross Product	Yes	≥ 80000	★
Total Crashes	1	>0	★
			★★★★

Describe Proposed Safety Improvements

Description	Unit Cost		Units	Cost	Notes -
Roundabout	$4,200,000	per intersection	0	$0.00	
Directional Median	$1,080,000	per intersection	0	$0.00	
Mainline Dynamic Warning Sign	$60,000	per intersection	0	$0.00	
Close Median	$30,000	per intersection	0	$0.00	
Installing Street Lights	$10,200	per street light	1	$10,200.00	
Upgrade Stop Sign	$540	per sign	1	$540.00	
Upgrade Junction Sign	$540	per sign	1	$540.00	
Upgrade Stop Ahead Sign	$600	per sign	1	$600.00	
Upgrade Stop Ahead Marking	$600	per marking	0	$0.00	
Upgrade Stop Bar	$360	per marking	1	$360.00	
Review Signs and CST	$2,940	per intersection	0	$0.00	
				$12,240.00	

Signs and Markings and Street Light project costs vary by the number of minor legs associated with the intersection.

Project Cost Estimate (attach detailed copy)

Federal Funds	$11,016
Local Match (10% of Total project cost)	$1,224
Total Project Cost	**$12,240**

Proposed Year of Construction

NDDOT Central Office Only

Project Accepted?	☐ Yes ☐ No	Reference Number		ID Number	

Notes

23 USC 409
NDDOT Reserves All Objections

Intersection ID: 504.02
Date: 10/15/2014

HIGHWAY SAFETY IMPROVEMENT PROGRAM (HSIP) PROJECT APPLICATION

North Dakota Department of Transportation Programming
SFN 59959 (06-2011)

75th St SW & ND 67

Agency Name: Slope County **ND DOT District: 5**
Contact Name: Dale Powell **Telephone Number: 701-879-6276**
Email Address: djpowell@nd.gov

Please attach a location map(s). You may use additional sheets to further describe your project.

Location Description

Configuration:	X	Traffic Control Device:	Thru-STOP
Configuration (2):	Undivided	Street Lights:	No
Urban/Rural:	Rural	Flashers:	No
County:	Slope	Major Entering ADT:	240
Entering ADT:	275	Minor Entering ADT:	35
Jurisdiction:	State	Oil Project:	No

SHSP Emphasis Area (check all that apply)

- ☐ Reduce Alcohol Impaired Driving
- ☐ Increase the Use of Safety Restraints for all Occupants
- ☐ Younger Driver/Older Driver Safety
- ☐ Curb Aggressive Driving
- ☐ Improvements to Address Lane Departure Crashes
- ☐ Enhancing Emergency Medical Capabilities to Increase Survivability
- ☑ Improve Intersection Safety

Describe Current Safety Issues & Systemic Ranking Review

North Dakota Crashes, 2009 - 2013 5 years

	Total	Angle	K+A
Crashes	1	0	0.00
Rate (per MVM)	2.0	0.0	0.0

	Value	Critical	Risk Ranking
Skew	No	Yes	
On/Near Curve	Yes	Yes	★
Development	No	Yes	
Near RR Crossing	No	Yes	
Distance from previous STOP	Yes	Yes	★
Volume Cross Product	No	≥ 80000	
Total Crashes	1	>0	★
			★★★

Describe Proposed Safety Improvements

Description	Unit Cost		Units	Cost
Roundabout	$4,200,000	per intersection	0	$0.00
Directional Median	$1,080,000	per intersection	0	$0.00
Mainline Dynamic Warning Sign	$60,000	per intersection	0	$0.00
Close Median	$30,000	per intersection	0	$0.00
Installing Street Lights	$10,200	per street light	0	$0.00
Upgrade Stop Sign	$540	per sign	2	$1,080.00
Upgrade Junction Sign	$540	per sign	2	$1,080.00
Upgrade Stop Ahead Sign	$600	per sign	2	$1,200.00
Upgrade Stop Ahead Marking	$600	per marking	0	$0.00
Upgrade Stop Bar	$360	per marking	2	$720.00
Review Signs and CST	$2,940	per intersection	0	$0.00
				$4,080.00

Notes -

Signs and Markings and Street Light project costs vary by the number of minor legs associated with the intersection.

Project Cost Estimate (attach detailed copy)

Federal Funds	$3,672
Local Match (10% of Total project cost)	$408
Total Project Cost	**$4,080**

Proposed Year of Construction

NDDOT Central Office Only

Project Accepted?	☐ Yes ☐ No	Reference Number		ID Number	

Notes

23 USC 409
NDDOT Reserves All Objections

Intersection ID: 503.01
Date: 10/15/2014

HIGHWAY SAFETY IMPROVEMENT PROGRAM (HSIP) PROJECT APPLICATION

North Dakota Department of Transportation Programming
SFN 59959 (06-2011)

Camp Crook Rd & US 12

Agency Name: Slope County | **ND DOT District: 5**
Contact Name: Dale Powell | **Telephone Number: 701-879-6276**
Email Address: djpowell@nd.gov

Please attach a location map(s). You may use additional sheets to further describe your project.

Location Description

Configuration:	T	Traffic Control Device:	Thru-STOP
Configuration (2):	Undivided	Street Lights:	No
Urban/Rural:	Urban	Flashers:	No
County:	Slope	Major Entering ADT:	790
Entering ADT:	963	Minor Entering ADT:	173
Jurisdiction:	State	Oil Project:	No

SHSP Emphasis Area (check all that apply)

- ☐ Reduce Alcohol Impaired Driving
- ☐ Increase the Use of Safety Restraints for all Occupants
- ☐ Younger Driver/Older Driver Safety
- ☐ Curb Aggressive Driving
- ☐ Improvements to Address Lane Departure Crashes
- ☐ Enhancing Emergency Medical Capabilities to Increase Survivability
- ☑ Improve Intersection Safety

Describe Current Safety Issues & Systemic Ranking Review

North Dakota Crashes, 2009 - 2013 — 5 years

	Total	Angle	K+A
Crashes	0	0	0.00
Rate (per MVM)	0.0	0.0	0.0

	Value	Critical	Risk Ranking
Skew	No	Yes	
On/Near Curve	Yes	Yes	★
Development	No	Yes	
Near RR Crossing	No	Yes	
Distance from previous STOP	Yes	Yes	★
Volume Cross Product	Yes	≥ 80000	★
Total Crashes	0	>0	
			★★★

Describe Proposed Safety Improvements

Description	Unit Cost		Units	Cost
Roundabout	$4,200,000	per intersection	0	$0.00
Directional Median	$1,080,000	per intersection	0	$0.00
Mainline Dynamic Warning Sign	$60,000	per intersection	0	$0.00
Close Median	$30,000	per intersection	0	$0.00
Installing Street Lights	$10,200	per street light	1	$10,200.00
Upgrade Stop Sign	$540	per sign	1	$540.00
Upgrade Junction Sign	$540	per sign	1	$540.00
Upgrade Stop Ahead Sign	$600	per sign	1	$600.00
Upgrade Stop Ahead Marking	$600	per marking	1	$600.00
Upgrade Stop Bar	$360	per marking	1	$360.00
Review Signs and CST	$2,940	per intersection	0	$0.00
				$12,840.00

Notes - Segment and curve projects suggested on other sheets.

Signs and Markings and Street Light project costs vary by the number of minor legs associated with the intersection.

Project Cost Estimate (attach detailed copy)

Federal Funds	$11,556
Local Match (10% of Total project cost)	$1,284
Total Project Cost	**$12,840**

Proposed Year of Construction

NDDOT Central Office Only

Project Accepted?	☐ Yes ☐ No	Reference Number		ID Number	

Notes

23 USC 409
NDDOT Reserves All Objections

Intersection ID: 501.01
Date: 10/15/2014

APPENDIX

Stark County

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APPENDIX

City of Dickinson

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APPENDIX

Williams County

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APPENDIX

City of Williston

[Appendix Intentionally Left Blank]

APPENDIX

Theodore Roosevelt National Park

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5.0 Behavioral Safety Strategies

5.1 Purpose of Driver Behavior Safety Strategies

North Dakota's LRSP recognizes that driver behavior is a significant factor contributing to a majority of the severe crashes on North Dakota's local roads. Traffic crashes may result from any combination of overlapping crash factors: the roadway, the vehicle, and driver behavior. Research supports and experts agree that in most cases driver behavior—risky decisions, driver error, lapses of attention, and driver limitations—is a chief factor contributing to traffic crashes (Lerner et al., 2010). Severe traffic crashes in North Dakota's western region can be largely prevented and reduced if motorists, with an emphasis on younger drivers, were persuaded to engage in key safe driving practices to buckle up, drive at safe speeds, pay attention, and plan ahead to avoid impaired driving. For maximum safety benefit, these measures should be undertaken in addition to adopting infrastructure safety strategies to help ensure the safest and most forgiving roadway possible.

5.2 Overview of Behavioral Crash Data for Western Region

Unbelted Vehicle Occupants: Traffic safety research demonstrates that a motorist's seat belt is the most effective defense in the event of a crash. When lap and shoulder seat belts are properly used, the risk of fatal injury to front-seat passenger car occupants is reduced by 45 percent and the risk of moderate-to-critical injury is reduced by 50 percent (NHTSA, 2001). Safety benefits are even greater for light-truck occupants, with seat belt usage reducing fatalities by 60 percent and moderate-to-critical injury by 65 percent (NHTSA, 2009). North Dakota's 2013 statewide seat belt use by drivers and right-front seat passengers is 77.7 percent; lower than the 2012 nationwide use of 86 percent. Reducing unbelted severe crashes is the western region's greatest opportunity to improve road safety by improving driver behavior. The trend of severe unbelted crashes is increasing statewide. With 46 percent of the region's severe crashes involving unbelted motorists, the western region is slightly below the 48-percent statewide-unbelted severe crashes. However, of the severe crashes on the local road system, 55 percent of severe crashes involved an unbelted vehicle occupant.

Alcohol-Related Crashes: Although the number of impaired driving fatalities has decreased nationally since 2007, the percentage of alcohol-impaired fatalities in the U.S. has remained essentially unchanged (NHTSA, 2012a). Similarly, over the last decade, each year nearly half of motor vehicle fatalities statewide in North Dakota are to be alcohol-related. In the western region, severe alcohol-related crashes are the same percentage as the statewide severe alcohol-related crashes at 29 percent. According to statewide crash data, nearly half of these preventable severe crashes are on the local road system.

Young Driver-Involved: Young drivers have the highest rate in fatal crashes of any age group. Nationally, the fatal crash rate of drivers age 16 to 20 is nearly twice that of drivers age 21 and older (NHTSA, 2012b). Key underlying factors to their high crash risk are the developmental and behavioral issues of adolescence coupled with driving inexperience. Too often, young drivers immaturely take risks while driving, without thinking through the potential

consequences of their life-threatening decisions (Keating, 2007). Such high-risk behaviors typically include lack of seat belt use, speeding/aggressive driving, and distractions while driving. Although severe injury crashes involving young drivers have gradually declined statewide, young drivers under the age of 21 continue to be overrepresented in crashes with 67 percent statewide occurring on local roads. In the western region, 17 percent of severe crashes involve young drivers, which is lower than the 21 percent of statewide severe crashes.

Excessive Speed or Aggressive Driving: Speeding is common and a tough nut to crack nationally and in North Dakota. Although drivers generally acknowledge that speeding is an unsafe behavior, speeding remains common because the perceived risk of injury is low relative to the perceived benefits of driving fast such as saving time and driving pleasure (Lerner et al., 2010). Consequently, the percentage of speeding-related fatal crashes has remained essentially unchanged over the years and remains a contributing factor in 31 percent of traffic fatalities in the U.S. (NHTSA, 2012c). Speeding and aggressive driving continue to account for approximately 25 percent of all severe crashes in North Dakota with 62 percent of these crashes statewide occurring on the local road system. In the western region, the percentage of severe speeding/aggressive driving crashes is the same as the statewide percentage of 26 percent.

5.3 Importance of Traffic Safety Culture Change

5.3.1 Influence of Traffic Safety Culture

In adopting North Dakota's long-term vision of zero fatalities, the 2013 North Dakota SHSP established a collective goal to reduce the 3-year average of traffic fatalities to 100 or fewer by 2020. To accomplish this interim goal, the western region, together with its traffic safety partners, seeks to develop and implement its LRSP safety strategies within the broader societal context of motorists' behavior and North Dakota's traffic safety culture. Traffic safety culture can be defined as the implicit shared values, beliefs, and perceptions that shape motorists' behavior.

5.3.2 Social Norms Inhibiting a Strong Traffic Safety Culture

At the core of the nation's and North Dakota's traffic safety challenge is a complacency toward risk taking by drivers and a tolerance for traffic crashes and the resulting deaths and serious injuries. Contributing factors include a sense of individual driver invulnerability, perceived driving skills and vehicle control, and a sense of anonymity and entitlement on the road. The latest data from the *2012 Traffic Safety Culture Index Survey* reports that, as in previous years, the safety culture in the United States surrounding distracted driving can best be described as "do as I say, not as I do" — due to the high numbers of people who object to certain behaviors, yet will admit that they, themselves, engage in them (AAA, 2012). Real progress in traffic safety depends largely on addressing and changing this culture of indifference to effectively implement and see results of both SHSP and LRSP safety strategies.

5.3.3 Social Levels Influencing Safety Culture

Efforts to change individual driver and motorist behaviors should be planned and executed from an ecological viewpoint—one that examines the driving public and their interaction with their social environments. Traffic safety culture and its influence operate at different levels within society. Therefore, a broader definition of traffic safety culture includes the values, beliefs, and perceptions of not only the individual driver, but of those shared by the various

communities of which the driver is a part (Figure 5-1). The individual driver exists within a system that includes the following levels, each embodying factors that influence driving culture and crash risk (Ward et al., 2010; Dahlberg and Krug, 2002):

- Individual level – Factors such as driver age, driving experience, self-esteem, income, and substance abuse
- Relationship level – Factors such as relationships with peers, coworkers, supervisors, and family members
- Community level – Factors include the settings or environments in which relationships occur such as school, church, workplaces, and neighborhoods
- Societal level – Large-scale factors such as safety, health, economic, and educational policies, as well as government commitments and priorities

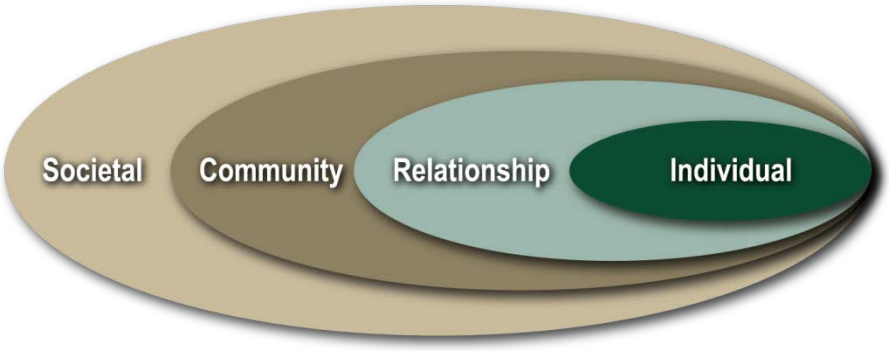

FIGURE 5-1
Social Ecological Perspective of Culture
Source: "Violence – A Global Public Health Problem" by L.L. Dahlberg and E.G. Krug, in *World Report on Violence and Health* (World Health Organization)

Social norms at each level and within each group point to those behaviors that are perceived as important. Norms create conformity to expectations that allows people (that is, drivers) to successfully socialize to the subcultures in which they belong. These norms create a climate in which unsafe driving behavior is either encouraged or discouraged. Perceived social norms condoning high-risk driving behaviors provide the case for drivers to rationalize their own high-risk behaviors. To accomplish the culture change, traffic safety behavioral strategies seek to make safe-driving behaviors the accepted norm across all social ecological levels.

The implication of the social-ecological model for LRSP efforts is that the implementation plans of LRSP strategies plans should attempt to:

- Increase perceived social pressure to comply with traffic safety laws and practices, thereby producing safety behavioral norms (Ward et al., 2010).
- Shift the social acceptance of high-risk behaviors to one of perceived unacceptance by significant others and one's peers.

5.4 Behavioral Safety Strategies

5.4.1 Role of Policy, Education, and Enforcement

Techniques or strategies to change driver behavior essentially fall into one of three categories: 1) *policy change* or laws, local ordinances, regulations, sanctions and penalties; 2) *enforcement* of the laws; and 3) *education* or public information, media, and training. These three categories of behavioral safety strategies work together to have the greatest impact on changing risky driver behavior. The degree of effectiveness of any one strategy on behavioral change depends not only on how effectively the strategy is implemented, but also on how these three categories of policy, enforcement, and education are working together.

For example, a state or local agency that is seeking to increase motorists' seat belt use and decides to use a "buckle up" public information campaign (behavioral change strategy). The effectiveness of the campaign not only depends on the quality of the education or public information campaign (relevance to target group, duration, saturation of the messaging), but also the strength of the law in place (primary vs. secondary seat belt law, all passengers vs. front seat only, higher penalty/fee vs. low penalty/fee) and, most important, the degree of seat belt use enforcement (coverage, intensity, visibility by the public).

Consequently, the strength of driver safety policy, enforcement, and education surrounding a behavioral strategy selected greatly impact its effectiveness. Therefore, when selecting and implementing a behavioral strategy, an agency must examine the policy, enforcement, and educational context of the strategy and explore ways to strengthen each, as appropriate, to gain the most from a selected strategy.

Finally, it is critically important that traffic safety enforcement is viewed as a priority within local law enforcement agencies and that agency leaders and administrators advocate for strong local enforcement of traffic laws. It is imperative that agency leaders actively address political and public resistance and provide a pathway to deploy the leading strategy to save lives on North Dakota roadways—effective traffic enforcement coupled with public outreach. By advocating for enforcement, educating local elected officials, and equipping officers to effectively enforce traffic safety laws, North Dakota will reap far greater life-saving outcomes from its local safety initiatives.

5.4.2 Effective Use of Public Information Strategies

Public information (education) strategies are often popular among communities seeking to change risky driving behaviors. Education or public information campaigns can range from brochures and mailings to peer-to-peer safety messaging. Brochures and mailings are a passive approach, while peer-to-peer messaging provides a more effective behavioral change approach. In general, a key challenge in influencing driver behavior is that most drivers know what they are supposed to do to drive safely, yet due to successfully driving with risky patterns with no incidence of crash, drivers underestimate the risk of their choices. For this reason, research supports that education, coupled with enforcement, will have the strongest impact in changing driver behavior (NHTSA, 2013).

The following are key characteristics of impactful public information/education campaigns (Williams, 2007):

- Implemented in support of a high-visibility enforcement program

- Focused messaging for a target group
- Longer-term programs delivering messages of sufficient intensity over time
- Messages communicating new information not previously well known
- Messages that are part of a broader-based, longer-term community program with similar messaging coming from multiple sources
- Using behavior change models including interactive methods teaching skills to resist social pressure (such as role playing, group discussion)

5.4.3 LRSP Phase 3 Western Region Priority Strategies

During the LRSP workshop, participants reviewed western region's behavioral crash data and discussed behavioral safety strategy alternatives that could be implemented at the local level. Based on the strategy review discussions, participants engaged in a prioritization process to identify the preferred local behavioral safety strategies for the four behavioral critical emphasis areas. In addition, participants identified the priority behavioral strategy to promote heavy truck safety in the western region. Table 5-1 reflects the LRSP Phase 3 results of the strategy prioritization, as well as each strategy's alignment with the North Dakota SHSP (indicated by an "X" if included in the SHSP).

TABLE 5-1
North Dakota Phase 3 LRSP Workshop Priority Behavioral Strategies and Relationship with the North Dakota SHSP

Phase 3 LRSP Western Region Workshop Priority Driver Behavior Strategies and Their Relationship with the North Dakota SHSP	2013 North Dakota SHSP
Impaired Driving	
• Support community programs for alternative transportation	X
• Expand high-visibility DUI enforcement saturations including sobriety checkpoints	X
Speeding and Aggressive Driving	
• Identify high-risk speed locations/corridors for enhanced enforcement	X
• Conduct high-visibility targeted enforcement of speeding and aggressive driving *Note: Added the following speeding/aggressive driving enforcement strategy to support priority infrastructure safety strategy.* • Provide enhanced enforcement to support local agency implementation of red-light confirmation lights at at-risk intersection locations.	X
Young Drivers	
• Encourage driver education providers (local schools and private providers) to require parent education component	X
Unbelted Occupants	
• Enforce secondary seat belt use law	X
Heavy Truck – Behavioral	
• Promote heavy-truck driver training and education	

The following subsections provide a more complete description of each priority strategy, suggested steps to launch local agency efforts, recommended implementation resources, and potential future considerations for expanded local agency and community-based support for the SHSP safety strategies. It is important to note that multidisciplinary SHSP implementation teams will be formed to support the implementation of priority strategies for each of the six SHSP priority emphasis areas including: lane departure, unbelted vehicle occupants, alcohol-related, speeding/aggressive driving, young drivers, and intersections. Therefore, local agencies seeking to leverage local-level safety initiatives described in the following subsections are encouraged to coordinate with and/or engage in the statewide SHSP implementation teams.

5.4.4 Impaired Driving

Western Region Priority Strategy – Support community programs for alternative transportation

Description: A growing strategy in local communities to combat alcohol-impaired driving is to provide alternative community transportation services for those who have been drinking and who might otherwise choose to drink and drive. Alternative transportation programs may employ a variety of transportation alternatives including taxis, privately owned vehicles, buses, tow trucks, and law enforcement agents. To increase the accessibility of services, local communities often seek cooperative programming and cost-sharing approaches involving a spectrum of partners such as local drinking establishments and restaurants, alcohol beverage industry, local transportation providers, nonprofit community organizations and volunteers, agency participation, and the users themselves. Programs reflect a variety of options, from those that provide alternative transportation services within a limited time frame--a particular community festival or holiday--to professional year-round services to pick up drivers who have been drinking and their vehicles at a bar and transport both home (Sprattler, 2010). The most effective characteristics of safe ride programs most widely used by drinkers choosing not to drive include programs that are continually available, low or no cost to users, convenient, and easy to use (NHTSA, 2009).

Getting Started:

- Contact the Traffic Safety Office (TSO) to participate in the SHSP process as a stakeholder in the implementation of strategies identified for priority safety emphasis areas, such as impaired driving, in the SHSP.
- The following steps offer guidance to start a safe ride initiative in the local communities of the eastern region (adapted from Sprattler, 2010):
    1. Access community needs by identifying local impaired driving issues and potential barriers to the use of alternative transportation
    2. Identify community supporters and potential partners
    3. Call a meeting of all interested parties
    4. Determine the service area
    5. Choose or create transportation providers
    6. Develop “level of service” program model
    7. Establish hours and days of operation

8. Price services and secure cooperative funding
9. Determine program structure and management
10. Market the program to the hospitality industry, its patrons, and the public

Implementation Resources:

- See Section 5.5, Traffic Safety Office Supporting Resources.
- For assistance with identifying local community partners contact the NDDOT Traffic Safety Office (TSO) at (701) 328-4692
- For information on the SAFE CAB Program in Isanti County, Minnesota visit http://www.centurycouncil.org/drunk-driving/safe-cab-program.
- For information on how Minnesota has set up regional/county-based safe ride programs visit: http://www.minnesotatzd.org/topics/impaired/saferide/documents/report.pdf.
- For guidance on local community development or expansion of alternative transportation programs for impaired drivers and for a list of selected alternative transportation programs meeting core program evaluation criteria, see *Alternative Transportation Programs: A Countermeasure for Reducing Impaired Driving* at: http://mcs.nhtsa.gov/index.cfm/product/449/alternative-transportation-programs-a-countermeasure-for-reducing-impaired-driving-booklet.cfm
- For information on establishing community designated drivers programs, visit: http://www.nhtsa.gov/people/injury/alcohol/DesignatedDriver/comm1.html
- To contact local public health unit addressing alcohol use/impaired driving issues, see state listing located at: http://www.ndhealth.gov/localhd/lphu-directory.pdf
- For North Dakota road safety information including impaired driver facts sheets, issue briefs, and other education and outreach resources, visit the North Dakota State University (NDSU) Rural Transportation Safety and Security Center (RTSSC) at: http://www.ugpti.org/rtssc/resources/

  The NDSU Upper Great Plains Transportation Institute at: http://www.ugpti.org/resources/

Western Region Priority Strategy – Expand the use of high-visibility DUI enforcement saturation patrols including sobriety checkpoints

Description: High-visibility DUI enforcement is a high-priority, proven safety strategy to reduce severe alcohol-impaired crashes in North Dakota and across the nation. The most effective way to deter impaired driving is through a highly visible enforcement effort to reinforce the driving public's belief that impaired drivers are at high risk of being arrested, prosecuted, and adjudicated. High-visibility enforcement consists of multiple jurisdictions and/or multiple squads patrolling a segment of roadway at the same time, often using brightly colored vests and signs. Planned enforcement is publicized extensively through community kickoff events involving the local media and public education campaigns about the enforcement. High visibility also includes enforcement agencies reporting to news media the

outcome or arrests made during the saturation or checkpoint campaign. In addition to deterring driving after drinking by increasing the perceived risk of arrest, high-visibility enforcement extends the safety impact of the enforcement campaign for a longer period following the campaign.

What are saturation patrols?
Saturation patrols, also known as "dedicated DUI patrols," are stepped-up enforcement involving a greater number of law enforcement officers patrolling a specific area for a set time to identify and arrest impaired drivers. Multiple agencies often combine and concentrate their resources to conduct saturation patrols.

What are sobriety checkpoints?
At sobriety checkpoints, law enforcement officials evaluate drivers for signs of alcohol or drug impairment at certain points on the roadway. Vehicles are stopped in a specific sequence, such as every other vehicle or every fourth, fifth, etc. The frequency of which vehicles are stopped depends on the traffic conditions and the number of enforcement personnel available to staff the checkpoint.

Getting Started:

- Contact the Traffic Safety Office (TSO) to participate in the SHSP process as a stakeholder in the implementation of strategies identified for priority safety emphasis areas, such as impaired driving, in the SHSP.
- Assist local law enforcement agencies and Regional DUI Task Forces with identifying locations where a high number of impaired driving crashes have occurred in order to provide high-visibility enforcement.
- With local law enforcement, attend county board/city council meetings to speak on the importance of reducing impaired driving and the important role of both enforcement and engineering safety strategies.
- Collaborate with highway patrol, local law enforcement, community health officials, and local traffic safety stakeholders to use TSO DUI campaign materials to conduct community outreach on the enforcement campaigns.

Implementation Resources:

- For crash data to focus DUI enforcement efforts, contact the NDDOT Traffic Safety Office (TSO) at (701) 328-4692.
- To learn about local traffic safety enforcement activities and enforcement grant opportunities, contact the TSO and the TSO Law Enforcement Liaison.
- See Section 5.5, Traffic Safety Office Supporting Resources.
- For statewide impaired-driving enforcement mobilizations, the TSO distributes media outreach materials to local enforcement agencies, which may include press releases, talking points, camera-ready artwork and posters, impaired driving fact sheets, handouts for the public at checkpoints, a print public service announcement (PSA), and live-read radio PSAs. *(Note: TSO to assemble available information resources.)*

- For guidance on planning and publicizing saturation patrols and sobriety checkpoints:
  - *Saturation Patrols & Sobriety Checkpoints: A How-to Guide for Planning and Publicizing Impaired Driving Enforcement Efforts*, NHTSA, Report No. DOT HS 809 063, revised October 2002. http://www.nhtsa.gov/people/injury/alcohol/saturation_patrols/
  - *Low-Staffing Sobriety Checkpoints.* NHTSA, Report No. DOT HS 810 590, 2006. http://www.nhtsa.gov/people/injury/enforce/LowStaffing_Checkpoints/
- For information on the effective adjudication of DUI arrests and to inquire about DUI data sources, contact ND Traffic Safety Resource Prosecutors:
  - Aaron Birst at aaron.birst@ndaco.org, 701-328-7342
  - Kristi Pettit Venhuizen at 701/780-9276
- For community outreach using the Deutscher display depicting the remains of the Deutscher family vehicle that was struck and all members killed by a drunk driver, contact Kristi Engelstad, Display Coordinator, F-M Ambulance Service at kristi.engelstad@fmambulance.com, 701-364-1759.
- For North Dakota road safety information including impaired driver facts sheets, issue briefs, and other education and outreach resources, visit the NDSU Rural Transportation Safety and Security Center (RTSSC) at: http://www.ugpti.org/rtssc/resources/

  The NDSU Upper Great Plains Transportation Institute at: http://www.ugpti.org/resources/
- Other impaired-driving safety resources:
  - National Highway Traffic Safety Administration (NHTSA): http://www.nhtsa.gov/Impaired
  - Governor's Highway Safety Administration (GHSA): http://www.ghsa.org/html/issues/impaireddriving/index.html
  - Insurance Institute for Highway Safety: http://www.iihs.org/research/topics/alcohol_drugs.html

For additional impaired-driving safety strategies, see the following additional high-priority North Dakota Local Road Safety Program strategies:

- Employ alcohol screening and brief interventions by health care providers following an impaired driving crash. (Further explanation can be found in the North Dakota Local Road Safety Program, Phase 2, Cass County Report located at: http://www.dot.nd.gov/divisions/safety/trafficsafety.htm)
- Promote sobriety initiatives for DUI offenders: 24/7, ignition interlock, and DUI courts. (Further explanation can be found in the North Dakota Local Road Safety Program, Phase 2, Cass County and Eastern Region Reports located at: http://www.dot.nd.gov/divisions/safety/trafficsafety.htm)

- Educate and enforce zero tolerance laws for drivers under age 21. (Further explanation can be found in the North Dakota Local Road Safety Program, Phase 2, Eastern Region Report located at: http://www.dot.nd.gov/divisions/safety/trafficsafety.htm)
- Conduct court monitoring of prosecution and sentencing of DUI offenders. (Further explanation can be found in the North Dakota Local Road Safety Program, Phase 2, Grand Forks Region Report located at: http://www.dot.nd.gov/divisions/safety/trafficsafety.htm)

Potential future considerations for expanded local agency and community-based support of SHSP impaired-driving safety strategies:

- Engage local safety stakeholders (law enforcement, Mothers Against Drunk Driving [MADD], Students Against Drunk Driving [SADD], North Dakota Safety Council, community health provider, and emergency medical service providers) and facilitate coalition development to educate local elected officials on the importance of state agency impaired-driving legislative initiatives resulting from the state's comprehensive assessment of North Dakota impaired-driving laws.

5.4.5 Speeding/Aggressive Driving

Western Region Priority Strategy – Identify high-risk speed locations/corridors for enhanced speed enforcement

Description: Identifying locations that have a high number of speeding-related crashes are at the heart of an effective speed enforcement program. Enforcement and the associated public outreach efforts are most successful when deployed at specific locations or corridors and times when speeding is most likely to occur. Strengthened analysis of the following sources of data and information provides the focus needed for more effective, targeted enforcement and public outreach to reduce speeding-related severe crashes:

- Current and historical crash records and citation data
- Engineering traffic and speed data
- Law enforcement experience
- Public input

Getting Started:

- Contact the Traffic Safety Office (TSO) to participate in the SHSP process as a stakeholder in the implementation of strategies identified for priority safety emphasis areas, such as speeding/aggressive driving, in the SHSP.
- Assist local law enforcement agencies with analyzing crash and traffic data to identify locations where a high number of speeding/aggressive driving-related crashes have occurred in order to provide high-visibility enforcement.

  Data from other states suggests that rural road segments or corridors that have a higher density of lane-departure crashes and urban street segments that have a higher density of red-light-running crashes have also been found to have a higher density of speeding/ aggressive driving and other behavior-related crashes. Therefore, for suggested locations for

enhanced enforcement, see agency-specific priority locations for rural road segments at risk for lane-departure crashes and urban road segments at risk for red-light-running crashes in this report's Chapter 4 Appendix. (Note: HSIP flex funds may be used for overtime enforcement of at-risk locations for severe lane-departure and red-light-running crashes.)

Note on at-risk lane departure infrastructure safety strategies: To reduce severe lane-departure crashes on rural paved roads, the western region will be deploying infrastructure safety improvements (for example, centerline rumble strips, edge line rumble strips, adding or widening edge lines, high-visibility pavement markings) along select at-risk corridors. To maximize the expected safety benefit of the road improvements, integrating increased enforcement presence at targeted at-risk locations and timeframes will reduce risky driver behaviors by strengthening the public's perceived risk of being stopped.

Implementation Resources:

- For crash data and analysis to focus speed enforcement efforts, which may include the development of electronic pin maps of speeding-related crash locations, contact the NDDOT Traffic Safety Office (TSO) at (701) 328-4692.
- Work with NDDOT staff regarding specific design features of the system. Contact NDDOT Traffic Operations Section, Shawn Kuntz, (701) 328-2673.
- For speeding-related crash data by county, see *2013 North Dakota Crash Summary* at: http://www.dot.nd.gov/divisions/safety/docs/crash-summary.pdf
- The 2013 annual high crash location process is complete. Maps and crash listings for the 2011-2013 Urban High Crash Locations, 2009-2013 Rural Intersection High Crash Locations, and the 2011-2013 State Highway Segment Crash Map are currently available through the NDDOT Programming Division. Contact Shawn Kuntz at (701) 328-2673 or skuntz@nd.gov for a copy.
- See Section 5.5, Traffic Safety Office Supporting Resources.
- For a successful model of data-driven traffic enforcement, see Washington State's *Target Zero Team* project where planners use GIS mapping software to guide Target Zero patrols to where crashes were occurring and which roads led to high-collision areas at: http://www.wsp.wa.gov/targetzero/targetzero.htm#tzt
- For guidance on data-driven speed enforcement, see:

  NHTSA's Speed Enforcement Program Guidelines at: http://safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa09028/resources/Speed%20Enforcement%20Program%20Guidelines.pdf#page=1

  National Cooperative Highway Research Program (NCHRP) Report 500, Volume 23: *Guidance for Implementation of the AASHTO Strategic Highway Safety Plan: A Guide for Reducing Speeding-Related Crashes* at: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_500v23.pdf
- Other speeding-related safety resources:

  Governor's Highway Safety Administration: http://www.ghsa.org/html/issues/speeding.html

Insurance Institute for Highway Safety:
http://www.iihs.org/iihs/topics/t/speed/topicoverview

- For North Dakota road safety information including speeding facts sheets, issue briefs, and other education and outreach resources, visit the North Dakota State University (NDSU) Rural Transportation Safety and Security Center (RTSSC) at:
  http://www.ugpti.org/rtssc/resources/

  The NDSU Upper Great Plains Transportation Institute at:
  http://www.ugpti.org/resources/

Western Region Priority Strategy – Conduct high-visibility targeted enforcement of speeding and aggressive driving

Description: See Section 5.4.4 priority strategy, *Expand the use of high-visibility DUI enforcement saturation patrols including sobriety checkpoints,* for a full description of high-visibility/highly publicized enforcement campaigns.

North Dakota law enforcement agencies (state, county, city, and tribal) participate in the state's cooperative enforcement programs to reduce speeding-related fatalities and incapacitating injuries by stepped up enforcement of aggressive drivers of cars and trucks primarily in oil-production-impacted counties. For aggressive driving enforcement, officers focus on drivers who commit a combination of moving traffic violations such speeding, following too closely, and/or running red lights that endanger other persons or property.

Getting Started:

- Contact the Traffic Safety Office (TSO) to participate in the SHSP process as a stakeholder in the implementation of strategies identified for priority safety emphasis areas, such as speeding, in the SHSP.
- Assist local law enforcement agencies with identifying locations where a high number of speeding/aggressive driving-related crashes have occurred in order to provide high-visibility enforcement.
- With local law enforcement, attend county board/city council meetings to speak on the importance of enforcing the speed limit and reducing aggressive driving.
- Collaborate with highway patrol, local law enforcement, community health officials, and local traffic safety stakeholders to use TSO speeding campaign materials to conduct community outreach on the enforcement campaign.

Implementation Resources:

- For crash data and analysis to focus speed enforcement efforts, contact the NDDOT Traffic Safety Office (TSO) at (701) 328-4692.
- To learn about local traffic safety enforcement initiatives and enforcement grant opportunities, contact the TSO and the state's Law Enforcement Liaison at (701) 328-4692. Enforcement grant application information for overtime speed enforcement can be found at: https://www.dot.nd.gov/divisions/safety/trafficsafety.htm
- See Section 5.5, Traffic Safety Office Supporting Resources.

- For guidance for law enforcement on planning and publicizing local speed saturation patrols and successful case examples, see NHTSA's *Guidelines for Developing a Municipal Speed Enforcement Program* at:
  http://www.nhtsa.dot.gov/people/injury/enforce/program.htm
- For a summary of successful aggressive driving enforcement programs deployed at the local and state-level across the country, see NHTSA's *Aggressive Driving Enforcement: Strategies for Implementing Best Practices* at:
  http://www.nhtsa.gov/people/injury/enforce/aggressdrivers/aggenforce/
- Other speeding-related safety resources:

  Governor's Highway Safety Administration:
  http://www.ghsa.org/html/issues/speeding.html

  Insurance Institute for Highway Safety:
  http://www.iihs.org/iihs/topics/t/speed/topicoverview
- For North Dakota road safety information including facts sheets, issue briefs, and other education and outreach resources, visit the North Dakota State University (NDSU) Rural Transportation Safety and Security Center (RTSSC) at:
  http://www.ugpti.org/rtssc/resources/

  The NDSU Upper Great Plains Transportation Institute at:
  http://www.ugpti.org/resources/

Potential future considerations for expanded local agency, tribal, and community-based support of SHSP safety strategies:

- Engage local safety stakeholders (law enforcement, Mothers Against Drunk Driving [MADD], Students Against Drunk Driving [SADD], North Dakota Safety Council, community health provider, emergency medical service providers) and facilitate coalition development to educate local elected officials on the importance of state agency legislative initiatives to strengthen penalties such as increased fines for right-of-way and speeding violations.

Western Region Priority Strategy – Provide enhanced enforcement to support local agency implementation of red-light confirmation lights at at-risk intersection locations (*Note: Use HSIP flex funds for overtime enforcement.*)

Description: To reduce the most common type of severe crashes at signalized intersections—right-angle crashes—the western region seeks to deploy an innovative safety strategy using a downstream confirmation light system to reduce red-light running. A blue LED light mounted on the back of a traffic light is activated when a driver runs the red light. A single officer stationed across the intersection downstream from the traffic light can safely observe and pursue the red-light violator (instead of one officer to observe and an additional officer to pursue). To implement, red-light confirmation lights require interdependent collaboration of both engineering and enforcement; even more effective would be added public outreach about the red-light confirmation lights.

Getting Started:

- Contact the Traffic Safety Office (TSO) to participate in the SHSP process as a stakeholder in the implementation of strategies identified for priority safety emphasis areas, such as speeding and aggressive driving, in the SHSP.
- Work with NDDOT staff regarding specific design features of the system. Contact NDDOT Traffic Operations Section, Shawn Kuntz, (701) 328-2673.
- Coordinate with local law enforcement:
  - Ask for their assistance in locating the red-light confirmation lights on traffic signal poles/mast arms (that is, optimum viewing locations)
  - Ask for an agreement regarding minimum levels of enforcement (that is, 1 hour per day at any of the equipped locations)
  - Provide training to officers after installation – demonstrate that the "blue/confirmation" light does illuminate at the same instant as the red light of the traffic signal
- Encourage law enforcement to coordinate with the city/county attorney – make sure the attorney understands the technology and is willing to prosecute the violators.
- Encourage the city/county attorney to coordinate with the district court judge – make sure the judge understands the technology and will uphold charges and support the conviction of violators.
- Prior to issuing any tickets for violations using the red-light confirmation lights, have the traffic signal operations engineer check all of the signals clearance intervals (yellow + all red) to make sure they are 100-percent consistent with the agencies adopted guidelines. Have a note confirming compliance signed by the engineer put in the signal controller cabinet. (This will help address the inevitable complaint by those issued tickets that the agency changed the clearance intervals to generate more violators and increase revenue streams.)
- With local law enforcement, attend county board/city council meetings to speak on the community safety benefits of red-light confirmation lights.

Implementation Resources:

- For crash data and analysis to focus red-light enforcement efforts, contact the NDDOT Traffic Safety Office (TSO) at (701) 328-4692.
- See Section 5.5, Traffic Safety Office Supporting Resources.
- Safety project developed as part of the LRSP are eligible for funding through the state's Highway Safety Improvement Program (HSIP) including enhanced enforcement.
- Contact local agencies that have deployed red-light confirmation lights:
  - City of Burnsville Public Works, Minnesota
    Engineering Department
    100 Civic Center Parkway
    Burnsville, MN 55337
    Phone: (952) 895-4534

- Richardson Police Department, Texas
  140 North Greenville Ave.
  Richardson, TX 75081
  Phone: (972) 744-4800

5.4.6 Young Drivers

Western Region Priority Strategy – Encourage driver education providers (local schools and private providers) to require a parent education component

Description: Effective parental monitoring of teen driving can go a long way in helping to keep novice drivers safe on the roadway. Programs offering teen driver safety materials together with facilitated guidance help parents make the important connection between teen driving restrictions and teen driving risks. Without a required parent component for teen driver education, parents lack awareness of graduated driver's license (GDL) safety provisions, don't fully recognize teen driving risks, are often anxious to be relieved from shuttling their teens, may be reluctant to invest the necessary time to instruct and supervise their teen's driving, and often believe their teen is the exception and is a good and safe driver. Incorporating a parent education component into driver education programs is demonstrating promising results in overcoming these parent challenges and more effectively engaging parents.

Key components of a good parent education program include:

- Discusses risks for novice teen drivers
- Explains how and why GDL works to address the driving risks for young drivers
- Reviews the critical role parents play in teaching, supporting, and managing their novice drivers
- Explains the importance of and provides an opportunity to try out a parent/teen driving agreement
- Delivery by trained, educated facilitators
- Emphasizes parents and teens working together for safety

Getting Started:

- Contact the Traffic Safety Office (TSO) to participate in the SHSP process as a stakeholder in the implementation of strategies identified for priority safety emphasis areas, such as young drivers, in the SHSP.
- Learn about education providers in your local community by contacting the Traffic Safety Office at (701) 328-4692.
- Explore county-mandated parent training by examining the state of Virginia's Planning District 8 (includes four counties and four cities) 90-minute driving safety program for parents and teens as part of the in-classroom portion of the state's driver education curriculum. Contact Ben Swecker, (703) 791-7328 or Tim TeWalt, (703) 791-7353 at Prince William County Schools.
- With local law enforcement and driver educators, attend county board/city council meetings to inform them of the local initiative to incorporate parent education into driver education programs to more fully engage parents and reduce severe young driver crashes.

- Post information on teen driving laws on local school websites or request school resource officer to send information to parents highlighting driving risks for teens and existing North Dakota teen driver laws.
- Consider linking parent-teen participation in a teen-driving program to school parking privileges.

Implementation Resources:

- See Section 5.5, Traffic Safety Office Supporting Resources.
- For educational materials for parents of teen drivers including guidelines to ensure teen drivers are educated on safe driving practices as well as *The North Dakota Parent Guide to Teen Driving* and the *Parent Teen Driver Agreement*, see the Teen Drivers & Parents section of the NDDOT website: http://www.dot.nd.gov/divisions/safety/teens-parents.htm
- For a free mobile app for parents and teens to automatically track and log their supervised driving and includes tracking night driving, type of roads traveled and weather conditions, see: http://www.roadreadyapp.com/
- For an example parent-teen class outline and discussion guide, download the Minnesota Department of Public Safety, Office of Traffic Safety's *Teen Drivers: The Parent's Role* at: https://dps.mn.gov/divisions/ots/teen-driving/Documents/Parent-class-leaders-guide-july-2013.doc
- The Minnesota Office of Traffic Safety developed, *Point of Impact: Teen Driver Safety Parent Awareness Program,* as a community-based class for parents and their soon-to-be teen drivers. The Point of Impact Leader's Guide is a resource for implementing the class. The Point of Impact video is an important component of the program. A PowerPoint presentation and other information are available by contacting Gordy Pehrson at gordy.pehrson@state.mn.us.
- For information on the nationally recognized University of Michigan's *Checkpoints* program offering facilitated parent education: http://youngdriverparenting.org/ and http://www.saferdrivingforteens.org/
- For a comprehensive guide to strengthen parental roles in teen safe driving, see the Governors Highway Safety Association's (GHSA's) *Promoting Parent Involvement in Teen Driving: An In-Depth Look at the Importance and the Initiatives.* http://www.ghsa.org/html/publications/pdf/sfteens13.pdf
- For additional information on mandated and voluntary parent/teen education programs in Connecticut, Massachusetts, Georgia, and select Virginia counties, see GHSA's *Curbing Teen Driver Crashes: An In-Depth Look at State Initiatives.* http://www.ghsa.org/html/publications/pdf/sfteens12.pdf
- For age-specific information and resources for parents on how to start and continue the conversation about alcohol use with their children, see the North Dakota's *Parents LEAD* program (Listen, Educate, Ask, Discuss). http://www.parentslead.org/

- For PowerPoint presentations, parent/teen activities and other tools to be adopted for driver education providers, see *Teendriversource*: *Research Put into Action.* www.teendriversource.org
- For information on *Teen Driving Parents/Alive at 25* that includes a 1-hour parent, 4-hour teen driving program including a comprehensive publication, *Teen Driver; A Family Guide to Teen Safe Driving*. http://www.nsc.org/products_training/Products/MotorVehicleSafety/Pages/TeenDriving.aspx
- For information in Utah's award winning "Don't Drive Stupid" Parent Night Program. http://publicsafety.utah.gov/highwaysafety/documents/smart.pdf http://www.ghsa.org/html/meetings/awards/2013/13utah.html
- For information on *Parents are the Key* and free downloadable resources that can be customized. www.cdcgov/ParentsAreTheKey/
- For North Dakota road safety information including facts sheets, issue briefs, and other education and outreach resources, visit the North Dakota State University (NDSU) Rural Transportation Safety and Security Center (RTSSC) at: http://www.ugpti.org/rtssc/resources/

  The NDSU Upper Great Plains Transportation Institute at: http://www.ugpti.org/resources/

Other high-impact strategies for local agency consideration:

- Publicize and conduct high-visibility enforcement of teen driver GDL restrictions, teen cell-phone-use and texting-while-driving laws, underage drinking and driving, and seat belt use laws. (Further explanation can be found in the North Dakota Local Road Safety Program, Phase 2, Cass County Report located at: http://www.dot.nd.gov/divisions/safety/trafficsafety.htm)
- Conduct locally facilitated peer-to-peer driver safety outreach campaigns designed for high school students to raise peer awareness of the common risk factors threatening novice drivers.

Consideration for future expanded local agency/community support of the North Dakota SHSP young driver safety strategies:

- Engage local traffic safety stakeholders (law enforcement, school administrators, driving schools, insurance companies, community health providers, and emergency medical service providers) and facilitate coalition development to educate local elected officials on the importance of state agency GDL and teen driver safety policy initiatives.

5.4.7 Unbelted Occupants

Western Region Priority Strategy – Enforce secondary seat belt law

Description: Research has demonstrated that the most important difference between the high and low seat-belt-use states is enforcement of the states' belt use law, and this is true for both secondary and primary law states (NHTSA, 2008). Although a few geographic, demographic, and cultural factors are associated with lower seat belt use, none of these factors is a barrier to high seat belt use. However, law enforcement officers find it more difficult to enforce secondary belt laws and are sometimes reluctant to issue tickets because "secondary" status implies that these laws are of lower priority to their superiors, policy makers, judges, and the general public (NHTSA, 2008).

With the emphasis on enforcing the state's secondary seat belt law as the most effective strategy to increase seat belt use and reduce severe unbelted crashes, North Dakota law enforcement agencies (state, county, city, and tribal) participate in the state's *Click It or Ticket* mobilization program through stepped-up enforcement of unrestrained vehicle occupants. The mobilization is supported by national and local paid advertising and earned media campaigns aimed at raising awareness before the enforcement saturation. North Dakota now conducts four annual *Click It or Ticket* campaigns – including participation in the national *Click It or Ticket* campaign in May. North Dakota has increased its focus on nighttime seat belt use because fewer motorists buckle up at night resulting in a greater number of severe nighttime crashes.

See Section 5.4.4, *Expand the use of high-visibility DUI enforcement saturation patrols including sobriety checkpoints,* for a full description of high-visibility, highly publicized enforcement campaigns.

Getting Started:

- Contact the Traffic Safety Office (TSO) to participate in the SHSP process as a stakeholder in the implementation of strategies identified for priority safety emphasis areas, such as unbelted crashes, in the SHSP.
- Assist local law enforcement agencies with identifying locations where a high number of unbelted crashes have occurred in order to provide high-visibility enforcement.
- With local law enforcement, attend county board/city council meetings to speak on the importance and safety benefits of local enforcement of seat belt use.
- Collaborate with highway patrol, local law enforcement, community health officials, and local traffic safety stakeholders to use TSO seat belt use campaign materials to conduct community outreach on the enforcement campaign.

Implementation Resources:

- For crash data and analysis to focus seat belt enforcement efforts, contact the NDDOT Traffic Safety Office (TSO) at (701) 328-4692.
- To learn about local traffic safety enforcement initiatives, secondary enforcement strategies, and enforcement grant opportunities, contact the TSO and the state's Law Enforcement Liaison at (701) 328-4692. Enforcement grant application information for overtime belt enforcement can be found at: https://www.dot.nd.gov/divisions/safety/trafficsafety.htm

- See Section 5.5, Traffic Safety Office Supporting Resources.
- For statewide belt use mobilizations, the TSO distributes media outreach materials to local enforcement agencies which may include: press releases, talking points, camera-ready artwork and posters, belt-use fact sheets, a print public service announcement (PSA), and live-read radio PSAs. *(Note: TSO to assemble available information resources.)*
- For information on strategies and recommendations for effective enforcement of secondary belt use:

  How States Achieve High Seat Belt Use Rates
  http://www-nrd.nhtsa.dot.gov/Pubs/810962.pdf

  Innovative Seat Belt Demonstration Programs in Kentucky, Mississippi, North Dakota, and Wyoming, NHTSA, Report No. DOT HS 811 080, March 2009.
  http://www.nhtsa.gov/Driving+Safety/Occupant+Protection

  Avoiding "Tween" Tragedies: Demonstration Project to Increase Seat Belt Use Among 8- to 15-year-old Motor Vehicle Occupants, NHTSA, Report No. DOT HS 811 096, June 2012.
  http://www.nhtsa.gov/Driving+Safety/Occupant+Protection
- For guidance on planning and publicizing belt-use saturation patrols:

  NHTSA 2014 national seat belt enforcement *Products for Enforcement Action Kit (PEAK)* to help enforcement rally officers and alert the public to prepare for maximum high-visibility seat belt enforcement during the day and also at night.
  http://www.trafficsafetymarketing.gov/CIOT-PEAK

  Nighttime Enforcement of Seat Belt Laws: An Evaluation of Three Community Programs, NHTSA, Report No. DOT HS 811 189, August 2009.

  For the above and other belt enforcement and information outreach resources:
  http://www.nhtsa.gov/Driving+Safety/Occupant+Protection
- For North Dakota road safety information including facts sheets, issue briefs, and other education and outreach resources, visit the North Dakota State University (NDSU) Rural Transportation Safety and Security Center (RTSSC) at:
  http://www.ugpti.org/rtssc/resources/

  The NDSU Upper Great Plains Transportation Institute at:
  http://www.ugpti.org/resources/
- Other seat-belt safety resources:

  Center for Disease Control and Prevention seat belt briefing:
  http://www.cdc.gov/motorvehiclesafety/seatbeltbrief/

  Governor's Highway Safety Administration:
  http://www.ghsa.org/html/issues/occprotection/index.html

  Insurance Institute for Highway Safety:
  http://www.iihs.org/iihs/topics/t/safety-belts/topicoverview

Potential future considerations for expanded local agency, tribal, and community-based support of SHSP safety strategies:

- Pursue tribal ordinances for primary enforcement of seat belt laws.
- Pursue local support for primary seat belt law. (Further explanation can be found in the North Dakota Local Road Safety Program, Phase 2, Cass County, Eastern Region, and Grand Forks County Region Reports located at: http://www.dot.nd.gov/divisions/safety/trafficsafety.htm)
- Conduct community-wide and sustained public information outreach to educate and create cultural awareness of the risks associated with unbelted motorists.

5.4.8 Heavy Truck – Behavioral Strategy

Western Region Priority Strategy – Promote heavy-truck driver training and education

Description: The United States is currently facing a heavy-truck driver shortage that is estimated to grow to over 230,000 drivers by 2022, and North Dakota's western region is experiencing an even faster-growing demand for drivers to support the region's booming oil industry (Commercial Vehicle Training Association, 2014). Consequently, with the high demand for heavy-truck drivers, trucking companies often turn to hiring available drivers who are inexperienced young males—the riskiest driving population—to meet the driver shortage. In the western region's oil-production counties, severe heavy truck crashes have increased from 6 crashes in 2008 to 92 crashes in 2013—a staggering increase of over 1,500 percent. Crash data for western region's oil-production counties reflects an over-representation of younger drivers (age 18 to 25) involved in severe single-vehicle, heavy truck crashes, supporting the likelihood of young and inexperienced drivers contributing to the region's severe heavy truck crashes. It is for this reason that western region safety workshop participants identified the importance of promoting heavy-truck driver training and education to help ensure as a key road safety strategy.

Getting Started:

- Locate community partners to collaborate with to promote awareness of the importance and availability of heavy-truck driver training and education programs. Potential partners include the North Dakota Motor Carriers Association, Federal Motor Carrier Safety Administration, and other training providers. For assistance in identifying partners, contact the Traffic Safety Office at (701) 328-4692.
- Promote and disseminate information to commercial employers, independent operators/ drivers, farmers, and farming cooperatives about available driver training courses.
- In cooperation with North Dakota Motor Carrier Division of the Highway Patrol and local law enforcement, attend county board/city council meetings to speak on the importance and safety benefits of a well-trained and qualified heavy-truck workforce.

Implementation Resources:

- To request a Highway Patrol Motor Carrier Division safety awareness presentation, submit your request by clicking on the following link and entering presentation request: http://www.nd.gov/ndhp/contact-form?region=dschweit@nd.gov

- The Federal Motor Carrier Safety Administration (FMCSA) requires States to issue a Commercial Driver's License (CDL) only after the driver passes knowledge and skills tests administered by the State and related to the type of vehicle the driver expects to operate. For registration, licensing, and safety information, see: http://www.fmcsa.dot.gov/resources-for-drivers
- For information on heavy-truck driver and industry professionals' continued training and education offered through the North Dakota Motor Carriers Association, available to both member and non-members, see: https://www.ndmca.org/Events.aspx
- For a one-stop resource for safety compliance materials on FMCSA's Compliance/Safety/Accountability or CSA program including posters, factsheets, brochures, and PowerPoint presentations, see: http://csa.fmcsa.dot.gov/YourRole/Drivers.aspx
- Driver training occurs largely through CDL training schools for new heavy truck drivers and the successful skills and knowledge-based testing to be a CDL license holder. For CDL driver training and advanced driver training programs in the western region and in North Dakota, see:
  http://www.nitalaska.com/north-dakota/truck-driver-training/
  http://www.nitalaska.com/north-dakota/safety-training/thinking-driver/
  http://www.willistonstate.edu/News-and-Events/Events/TrainND/CDL-Class-Minot.html
  http://www.toptruckingschools.com/states/north-dakota/

  For customized employer heavy truck driver training programs, see:
  http://www.nitalaska.com/north-dakota/curriculum-development/
- For information on how to haul the most legal weight without violating truck-weight laws and to learn tips on how to configure trucks with proper axle spacing and tire size, see North Dakota Local Technical Assistance Program (NDLTAP) *Truck-Weight Education and Outreach Program*:
  http://www.ndltap.org/events/view.php?id=343
- For North Dakota road safety information including facts sheets, issue briefs, and other education and outreach resources, visit the North Dakota State University (NDSU) Rural Transportation Safety and Security Center (RTSSC) at:
  http://www.ugpti.org/rtssc/resources/

  The NDSU Upper Great Plains Transportation Institute at:
  http://www.ugpti.org/resources/

5.5 Traffic Safety Office Supporting Resources

Unless otherwise indicated, for technical assistance and supporting resources contact the NDDOT Traffic Safety Office (TSO) at (701) 328-4692.

5.5.1 TSO Grant Program Application Process

The TSO solicits grant applications from eligible state and local agencies and for-profit and nonprofit organizations that address North Dakota's problem solution plans (PSPs). These PSPs reflect the state's greatest opportunities for behavioral safety improvement. Grant applications are due June 30 of each year and are evaluated based on: (1) response to identified safety issues, (2) proposed evidenced-based strategy, (3) clear objectives, (4) comprehensive evaluation plans, and (5) cost-effective budgets. Selected projects are included in TSO's Highway Safety Plan and, once approved by NHTSA, grant contracts are generally effective October 1 through September 30.

5.5.2 Technical Assistance

County Outreach Program

The TSO, in cooperation with the North Dakota Association of Counties, offers a county-based Traffic Safety Outreach program to provide advocacy and community mobilization, media support, public outreach, and training to address seat belt use, impaired driving, speeding, and distracted driving at the county level. County participants include county employees, county officials, law enforcement, transportation engineering, public health, schools, businesses, nonprofit agencies, media, and other entities.

5.5.3 Traffic Records/Crash Data

Traffic and Criminal Software

The quality of traffic safety issue identification and decision-making regarding effective safety strategies and their implementation is based on the quality and timeliness of crash data. Data are collected from officer crash reports at the time of the incident when a crash involves fatalities, injuries, or at least $1,000 in property damage. The NDDOT reviews the crash report and enters the data into their centralized database, the Crash Reporting System (CRS).

To assist law enforcement in providing timely, complete, and accurate crash reports, the NDDOT Traffic Safety Office supports the installation of Traffic and Criminal Software (TraCS) and provides technical assistance and training to local agency and tribal law enforcement to effectively deploy TraCS for in-the-field incident reporting. Local and tribal enforcement agencies are strongly encouraged to use TraCS to electronically submit crash reports to the NDDOT. Key benefits to participating agencies and tribes are the reduced officer time and effort required for duplicate entry into local and state crash databases, and reduced need for data entry resources and administrative support, as well as improving the overall quality and timeliness of the crash data.

Local Agency Crash Data Support

The Upper Great Plains Transportation Institute develops crash data summaries for each law enforcement agency under contract with the TSO for overtime enforcement supporting impaired driving and seat belt enforcement campaigns. The crash data summaries demonstrate the priority crash factors and trends within each local agency's jurisdiction.

Annual Crash Summary

The NDDOT annually publishes the Crash Summary to identify and describe the annual crash data and historical crash trends in North Dakota, including the description of factors contributing to the occurrence of traffic crashes and the resulting injuries and fatalities. The Crash Summary is a valuable resource for local agencies and their safety partners for issue identification, safety strategy planning, targeted strategy implementation, program evaluation, and media inquiries. The document is located at:
http://www.dot.nd.gov/divisions/safety/docs/crash-summary.pdf

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23 USC 409

NDDOT Reserves All Objections

APPENDIX

US Supreme Court Validation of 23 U.S.C. § 409

23 U.S.C. § 409 : US Code - Section 409: Discovery and admission as evidence of certain reports and surveys

Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data

Pierce County, Washington v. Guillen

Supreme Court of the United States, 2003
123 U.S. 720

Brief Fact Summary

The Court addressed whether 23 U.S.C. section 409, which protects information "compiled or collected" in connection with certain federal highway safety programs from being discovered or admitted in certain federal or state trials, is a valid exercise of Congress's authority under the Constitution.

Rule of Law and Holding

This Court lacks jurisdiction to hear the tort portion of the case but has jurisdiction to hear the Public Disclosure Act portion. Certain state-court judgments can be treated as final for jurisdictional purposes even though further proceedings are to take place in the state courts.

Edited Opinion

Note: The following opinion was edited by CVN Law School staff. © 2008 Courtroom Connect, Inc.

JUSTICE THOMAS delivered the opinion of the Court.

We address in this case whether 23 U. S. C. § 409, which protects information "compiled or collected" in connection with certain federal highway safety programs from being discovered or admitted in certain federal or state trials, is a valid exercise of Congress' authority under the Constitution.

Beginning with the Highway Safety Act of 1966, Congress has endeavored to improve the safety of our Nation's highways by encouraging closer federal and state cooperation with respect to road improvement projects. To that end, Congress has adopted several programs to assist the States in identifying highways in need of improvements and in funding those improvements. Of relevance to this case is the Hazard Elimination Program (Program) which provides state and local governments with funding to improve the most dangerous sections of their roads. To be eligible for funds under the Program, a state or local government must undertake a thorough evaluation of its public roads. Specifically, § 152(a)(1) requires them to "conduct and systematically maintain an engineering survey of all public roads to identify hazardous locations, sections, and elements, including roadside obstacles and unmarked or poorly marked roads, which may constitute a danger to motorists, bicyclists, and pedestrians, assign priorities for the correction of such

locations, sections, and elements, and establish and implement a schedule of projects for their improvement."

Not long after the adoption of the Program, the Secretary of Transportation reported to Congress that the States objected to the absence of any confidentiality with respect to their compliance measures. According to the Secretary's report, the States feared that diligent efforts to identify roads eligible for aid under the Program would increase the risk of liability for accidents that took place at hazardous locations before improvements could be made. In 1983, concerned that the States' reluctance to be forthcoming and thorough in their data collection efforts undermined the Program's effectiveness, the United States Department of Transportation (DOT) recommended the adoption of legislation prohibiting the disclosure of information compiled in connection with the Program.

To address the concerns expressed by the States and the DOT, in 1987, Congress adopted 23 U. S. C. § 409, which provided:"Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled for the purpose of identifying[,] evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 152 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be admitted into evidence in Federal or State court or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data."

The proper scope of § 409 became the subject of some dispute among the lower courts. Some state courts, for example, concluded that § 409 addressed only the admissibility of relevant documents at trial and did not apply to pretrial discovery. According to these courts, although information compiled for § 152 purposes would be inadmissible at trial, it nevertheless remained subject to discovery. Other state courts reasoned that § 409 protected only materials actually generated by a governmental agency for § 152 purposes, and documents collected by that agency to prepare its § 152 funding application remained both admissible and discoverable.

As amended, § 409 now reads:

"Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 152 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data."

Ignacio Guillen's wife, Clementina Guillen-Alejandre, died on July 5, 1996, in an automobile accident at the intersection of 168th Street East and B Street East (168/B intersection), in Pierce County, Washington. Several months before the accident, petitioner had requested § 152 funding for this intersection, but the request had been denied. Petitioner renewed its application for funding on April 3, 1996, and the second request was approved on July 26, 1996, only three weeks after the accident occurred.

Beginning on August 16, 1996, counsel for respondents sought to obtain from petitioner information about accidents that had occurred at the 168/B intersection.1 Petitioner declined to provide any responsive information, asserting that any relevant documents were protected by § 409. After informal efforts failed to resolve this discovery dispute, respondents turned to the Washington courts.

While the appeal in the PDA action was pending, respondents filed a separate action, asserting that petitioner had been negligent in failing to install proper traffic controls at the 168/B intersection. In connection with the tort action, respondents served petitioner with interrogatories seeking information regarding accidents that had occurred at the 168/B intersection. Petitioner refused to comply with the discovery request, once again relying on § 409. Respondents successfully sought an order to compel, and petitioner moved for discretionary appellate review of the trial judge's interlocutory order.

Having determined that § 409 protects only information compiled or collected for § 152 purposes, and does not protect information compiled or collected for purposes unrelated to § 152, as held by the agencies that compiled or collected that information, we now consider whether § 409 is a proper exercise of Congress' authority under the Constitution. We conclude that it is.

It is well established that the Commerce Clause gives Congress authority to "regulate the use of the channels of interstate commerce." In addition, under the Commerce Clause, Congress "is empowered to regulate and protect the instrumentalities of interstate commerce, or persons or things in interstate commerce, even though the threat may come only from intrastate activities." As already discussed, Congress adopted § 152 to assist state and local governments in reducing hazardous conditions in the Nation's channels of commerce. That effort was impeded, however, by the States' reluctance to comply fully with the requirements of § 152, as such compliance would make state and local governments easier targets for negligence actions by providing would-be plaintiffs a centralized location from which they could obtain much of the evidence necessary for such actions. In view of these circumstances, Congress could reasonably believe that adopting a measure eliminating an unforeseen side effect of the information-gathering requirement of § 152 would result in more diligent efforts to collect the relevant information, more candid discussions of hazardous locations, better informed decisionmaking, and, ultimately, greater safety on our Nation's roads.

Consequently, both the original § 409 and the 1995 amendment can be viewed as legislation aimed at improving safety in the channels of commerce and increasing protection for the instrumentalities of interstate commerce. As such, they fall within Congress' Commerce Clause power. Accordingly, the judgment of the Washington Supreme Court is reversed, and the case is remanded for further proceedings not inconsistent with this opinion.

It is so ordered.