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A Message from the NDDOT Director

Enhancing roadway safety is critical to the health and well-being of the citizens of North Dakota and to others who travel on North Dakota’s roads. Safety is a top priority for the North Dakota Department of Transportation (NDDOT) and partners. In January 2018, Governor Doug Burgum, the NDDOT, the North Dakota Department of Health and the North Dakota Highway Patrol launched Vision Zero, a strategy to eliminate motor vehicle crash fatalities and serious injuries on North Dakota roads.

To guide Vision Zero, we are pleased to share with you the North Dakota Vision Zero Plan (Strategic Highway Safety Plan [SHSP] Update, 2018-2023), which will serve as the framework for all agencies and organizations working to achieve North Dakota’s Vision Zero goal. The plan was developed in partnership with the lead Vision Zero agencies and numerous other traffic safety stakeholders in the 4E areas of education, enforcement, engineering and emergency medical services and other disciplines. This plan meets the federal requirements of the SHSP for which the NDDOT has responsibility.

Over the past five years (2013-2017), North Dakota experienced a 22 percent reduction in motor vehicle crash fatalities. But, even one life lost to a motor vehicle crash on North Dakota roads is unacceptable.

Zero fatalities is not impossible, but it will take all of us to get there. The North Dakota Vision Zero Plan offers the opportunity for continued progress. Let’s work together to achieve the zero goal.

Sincerely,

Thomas K. Sorel
NDDOT Director
EXECUTIVE SUMMARY
This Vision Zero Plan (i.e., Strategic Highway Safety Plan [SHSP] Update, 2018-2023) is the result of a comprehensive and coordinated effort by North Dakota state agencies and more than 200 safety partners representing local and tribal governments and private organizations who are focused on reducing the number of motor vehicle crash fatalities on state and local roadways. This plan is data driven and analysis of North Dakota crash data was used to identify and prioritize crash types, safety strategies, and the types of roadway facilities considered the best candidates for safety investment.

The underlying foundations of this plan include a vision, mission statement, and a short-term goal (NDDOT, 2018a).

> **Vision:** Establish a culture of personal responsibility where motor vehicle fatalities and serious injuries are recognized as preventable and not tolerated.

> **Mission:** Eliminate fatalities and serious injuries caused by motor vehicle crashes.

> **Short-Term Goal:** To reduce annual motor vehicle crash fatalities to fewer than 75 by 2025.

Since 2009, fatalities in North Dakota have declined at a rate of approximately 1% per year. This decline includes the spike in fatalities from 2010 through 2013 that coincides with a period of unprecedented economic development and growth associated with the extraction of crude oil in the northwestern part of the state (Oil-Impact Counties). In response to the increase in traffic volumes and the number of crashes, North Dakota invested in roadway expansion and a variety of low-cost safety strategies in this area. As a result of North Dakota’s investment, the number of fatalities has fallen dramatically.

North Dakota’s crash data support the adoption of the following Priority Safety Emphasis Areas:

- Lane Departure.
- Intersections.
- Alcohol and/or Drug Related.
- Unbelted Vehicle Occupants.
- Speeding/Aggressive Driving.
- Young Drivers.

North Dakota’s current fatality trend (refer to Figure 2-1) is on a downward 1% per year slope that would reach 118 fatalities in 2025. To reach North Dakota’s Vision Zero interim goal of 75 or fewer by 2025 requires increasing the rate of crash reduction from 1% to approximately 4.6% annually. The Executive Leadership Team believes this can be achieved through implementing new bold and proven safety strategies.
In addition to these Priority Safety Emphasis Areas, North Dakota supports five Other Areas of Emphasis based on the number of serious injuries and increasing crash trends including:

- Heavy Vehicles.
- Local System Roadways.
- Older Drivers.
- Oil-Impact Counties.
- Pedestrians/Bicyclists.

North Dakota’s original SHSP was prepared in 2006 and updated in 2013 (CH2M HILL, 2013). Since 2013, North Dakota has focused safety investment on a list of priority safety strategies and has expanded safety investment to implement low-cost strategies along the local road system. The state has seen motor vehicle crash fatalities decline. Example accomplishments of this investment are highlighted below:

- Local Road Safety Program – North Dakota Department of Transportation (NDDOT) partnered with local agencies across the state to conduct a systemic risk-based evaluation of their systems and identify safety projects for low-cost, proven effective safety strategies at high-risk locations. The state’s Highway Safety Improvement Program (HSIP) has gone from very low levels of investment along local roadways to around 50%.
- Enhanced road edges — widespread implementation of rumble strips and wider edge lines along state and county roadways.
- Enhanced horizontal curve delineation — chevron warning signs along rural state, county, and tribal roadways.
- Enhanced intersection recognition — destination lighting at more than 300 rural intersections and upgraded traffic signs and pavement markings at almost 800 rural intersections along state, county, and tribal roadways.
- Enhanced pedestrian safety — countdown pedestrian timers and leading pedestrian intervals at urban signalized intersections.
- Enhanced technical assistance and training for behavioral safety partners — driving under the influence (DUI) training for law enforcement and court personnel and Child Passenger Safety workshops.
- Enhanced high visibility enforcement programs — results of crash analysis were used to better inform selection of times and locations for high visibility enforcement campaigns.
- Continued strengthening of traffic safety policy — strengthened state laws dealing with DUI (sanctions for high blood alcohol content (BAC) offenders and increased jail time for repeat offenders), Child Passenger Safety (requiring children through age 7 be restrained), and Distracted Driving.

This Vision Zero Plan builds on these accomplishments by continuing to focus on implementation of evidenced-based infrastructure strategies, such as:

- Rural safety corridors.
- Longitudinal delineators along rural two-lane highways.
- Street lights at rural intersections.
- Reduced conflict intersections along rural expressways.
- Barrier in freeway medians.

This plan also supports enhancing statewide policies addressing driver behavior, such as; enacting a primary seat belt enforcement law, adding ignition interlock to the menu of tools available to address alcohol and/or drug related driving, evidence-based behavioral strategies, and charging higher fines for right-of-way and speeding violations.
SECTION 1
Introduction
INTRODUCTION

LEADERSHIP STRUCTURE
Success of the North Dakota Vision Zero Plan depends, in part, upon an effective leadership structure to facilitate and oversee the development, implementation, monitoring, and updating of the plan. The Vision Zero leadership structure is detailed in Figure 1-1.

EXECUTIVE LEADERSHIP TEAM
The North Dakota Vision Zero Executive Leadership Team members provide high-level direction and are responsible for defining priority agency and organization-specific safety initiatives, dedicating and leveraging resources, and providing information and guidance on safety-related efforts to the Vision Zero Steering Committee.

The members of the Executive Leadership Team reflect North Dakota’s transportation leaders. Their commitment to paving the way for the effective adoption of bold safety strategies and intra- and inter-organizational cooperation is critical to reaching North Dakota’s goal of zero motor vehicle crash fatalities and serious injuries. The Executive Leadership Team members are detailed in Table 1-1.

Table 1-1. Executive Leadership Team

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Title</th>
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<tbody>
<tr>
<td>Crosby, R. Blake</td>
<td>North Dakota League of Cities</td>
<td>Executive Director</td>
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<td>Davis, Scott</td>
<td>North Dakota Indian Affairs Commission</td>
<td>Executive Director</td>
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<tr>
<td>Nelson, Mark</td>
<td>North Dakota Department of Transportation</td>
<td>Deputy Director</td>
</tr>
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<td></td>
<td></td>
<td>Driver and Vehicle Services and Business Operations</td>
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<tr>
<td>Pfennig, Phil Chief</td>
<td>North Dakota Bureau of Criminal Investigation, Office of Attorney General</td>
<td>Chief Agent</td>
</tr>
<tr>
<td>Solberg, Brandon</td>
<td>North Dakota Highway Patrol</td>
<td>Colonel</td>
</tr>
<tr>
<td>Sorel, Tom</td>
<td>North Dakota Department of Transportation, Governor’s Representative for Highway Safety</td>
<td>Director</td>
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<tr>
<td>Traynor, Terry</td>
<td>North Dakota Association of Counties</td>
<td>Executive Director</td>
</tr>
<tr>
<td>Tufte, MyLynn</td>
<td>North Dakota Department of Health</td>
<td>State Health Officer</td>
</tr>
<tr>
<td>VandeWalle, Gerald</td>
<td>North Dakota Supreme Court</td>
<td>Chief Justice</td>
</tr>
</tbody>
</table>
**STEERING COMMITTEE**

The North Dakota Vision Zero Steering Committee provides input and guidance to plan development, implementation, and monitoring. They also address emphasis area barriers, identify opportunities, and provide recommendations to the Executive Leadership Team.

The Steering Committee members (Table 1-2) serve as key champions of and leaders for the Priority Safety Emphasis Area Teams ensuring broad stakeholder engagement and effective coordination of safety strategy implementation and monitoring.

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>Benning, Paul</td>
<td>North Dakota Department of Transportation, Local Government Division</td>
<td>Local Government Engineer</td>
</tr>
<tr>
<td>Berger, Jane</td>
<td>North Dakota Department of Transportation, Programming Division</td>
<td>Programming Engineer</td>
</tr>
<tr>
<td>Birst, Aaron</td>
<td>North Dakota Association of Counties</td>
<td>Traffic Safety Resource Prosecutor</td>
</tr>
<tr>
<td>Ferrell, David</td>
<td>Federal Highway Administration, North Dakota Division Office</td>
<td>Safety and Traffic Operations Program Engineer</td>
</tr>
<tr>
<td>Foughty, Donovan</td>
<td>Northeast Judicial District (Ramsey County)</td>
<td>District Judge</td>
</tr>
<tr>
<td>Gerhart, Michael</td>
<td>North Dakota Motor Carriers Association</td>
<td>Executive Director</td>
</tr>
<tr>
<td>Halmrast, Curt</td>
<td>Oakes Ambulance, North Dakota EMS Association, and North Dakota EMS Advisory Council</td>
<td></td>
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<tr>
<td>Halmrast, Curt</td>
<td>Oakes Ambulance, North Dakota EMS Association, and North Dakota EMS Advisory Council</td>
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<tr>
<td>Hanson, Carma</td>
<td>Safe Kids Altru Health Systems</td>
<td>Coordinator</td>
</tr>
<tr>
<td>Haugland, Paul</td>
<td>Federal Motor Carrier Services Administration, North Dakota Division</td>
<td>State Program Manager</td>
</tr>
<tr>
<td>Huseith-Zosel, Andrea</td>
<td>Master of Public Health Program, College of Pharmacy, Nursing and Allied Sciences, North Dakota State University</td>
<td>Research Associate/Lecturer</td>
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<tr>
<td>Jackson, Glenn</td>
<td>North Dakota Department of Transportation, Driver’s License Division</td>
<td>Division Director</td>
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<tr>
<td>La Doucer, Gene</td>
<td>AAA of North Dakota</td>
<td>Senior Public Affairs Representative</td>
</tr>
<tr>
<td>McIntosh, Debbie</td>
<td>National Highway Traffic Safety Administration</td>
<td>Regional Program Manager</td>
</tr>
<tr>
<td>Moseman, Don</td>
<td>North Dakota Safety Council</td>
<td>Traffic Safety Director</td>
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<tr>
<td>Nelson, David</td>
<td>Northwest Judicial District (Williams County)</td>
<td>District Judge (Retired)</td>
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<tr>
<td>Nakos-Maier, Nancy</td>
<td>North Dakota Department of Human Services, Aging Services Division</td>
<td>Aging Services Program Administrator</td>
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<tr>
<td>Pettit-Venhuisen, Kristi</td>
<td>Kalash Pettit Attorneys at Law</td>
<td>Traffic Safety Resource Prosecutor</td>
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<td>Roark, Lt. Michael</td>
<td>North Dakota Highway Patrol, Safety and Education</td>
<td>Lieutenant</td>
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<td>Sagness, Pamela</td>
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<td>Slag, Mandy</td>
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<td>Injury Prevention Program Director</td>
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<td>Thurn, Carol</td>
<td>North Dakota Department of Transportation, Safety Division</td>
<td>Traffic Safety Manager</td>
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<td>Trotter, Ron</td>
<td>Turtle Mountain Band of Chippewa</td>
<td>Tribal Transportation Director</td>
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<td>Vachal, Kimberly</td>
<td>Rural Transportation Safety and Security Center, Upper Great Plains Transportation Institute, North Dakota State University</td>
<td>Director</td>
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<tr>
<td>Weigel, Roger</td>
<td>North Dakota Department of Transportation, Design Division</td>
<td>Design Engineer</td>
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<td>Wilson, Sandy</td>
<td>North Dakota Department of Transportation, Safety Division</td>
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<tr>
<td>Zainhofsky, Scott</td>
<td>North Dakota Department of Transportation, Planning and Asset Management Division</td>
<td>Planning and Asset Management Engineer</td>
</tr>
</tbody>
</table>

**Table 1-2. Steering Committee**
SAFETY EMPHASIS AREA TEAMS

The Priority Safety Emphasis Area Teams originate from an analysis of North Dakota’s serious crash data that point to the most common types of crashes and contributing factors. The six Emphasis Area Teams reflect the six priority safety emphasis areas of the North Dakota Vision Zero Plan. Emphasis Area Teams develop implementation action plans for priority strategies identified in the plan, engage safety partners and stakeholders in implementation, monitor progress, and recommend mid-course strategy changes if interim safety goals are not met.

Safety Emphasis Area Team members (Table 1-3) serve as the front-line, multi-disciplinary team which puts the plan into action. With more clearly defined roles and responsibilities, all safety stakeholders can identify how they can best support implementation efforts.

Table 1-3. Priority Safety Emphasis Area Teams

<table>
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<tr>
<th>Priority Emphasis Area</th>
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<th>Organization</th>
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<tr>
<td>Lane Departure</td>
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<td>Speeding/Aggressive Driving</td>
<td>Lt. Roark, Michael</td>
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</tr>
<tr>
<td>Young Drivers</td>
<td>LaDoucer, Gene</td>
<td>AAA of North Dakota</td>
</tr>
</tbody>
</table>

SAFETY PARTNERS

Vision Zero brings together a wide range of organizations and individuals under a unified commitment to reduce crash fatalities and serious injuries. In preparation for Vision Zero Plan development, two informational webinars and six regional Vision Zero workshops were conducted across the state to engage more than 200 safety partners. Stakeholders were from diverse disciplines including education, enforcement, engineering, and emergency medical services (the 4 Es of Safety), the courts, health care, and community safety advocates and provided the critical safety perspectives needed to move Toward Zero Deaths (TZD) and serious injuries on North Dakota roads.

NDDOT is grateful for the active participation of the following partner organizations to develop the Vision Zero Plan as well as the diverse safety stakeholders who actively support the plan’s implementation.

At a Vision Zero safety workshop in Bismarck, North Dakota, Howard Preston presents on an infrastructure strategy to safety stakeholders.
## Participating Organizations

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<td>AirMed (Sanford Health)</td>
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<tr>
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<td>North Dakota Association of Counties</td>
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SECTION 2

Vision, Mission, and Goals
VISION, MISSION, AND GOALS

NATIONAL TOWARDS ZERO DEATHS AND NORTH DAKOTA’S VISION ZERO

The national TZD strategy and the North Dakota Vision Zero program are based on the premise that even one crash-related death is unacceptable. TZD and North Dakota Vision Zero share core principles that acknowledge motor vehicle crash deaths are preventable. Human error on the roadway necessitates safeguards to reduce crash fatalities and an interdisciplinary, data-driven approach provides the foundation and diverse perspectives needed to address the complex road safety problem.

The national TZD initiative began in 2009 at a stakeholder workshop to develop a strategic safety plan that evolved into Toward Zero Deaths: A National Strategy on Highway Safety. The TZD National Strategy seeks to create a safety culture where drivers reject risky behaviors and all those who are involved in national, state, and local transportation systems incorporate safety into all their decisions (TZD, 2015).

In January 2018, NDDOT, North Dakota Highway Patrol (NDHP), and the North Dakota Department of Health (NDDoH), launched Vision Zero to serve as the framework to guide all statewide traffic safety activity, including (but not limited to):

1. Widespread public education/outreach.
2. Working with the legislature to ensure state laws represent best practices in traffic safety.
3. High visibility enforcement of existing laws.
4. Technology advancements.
5. Infrastructure/road safety improvements

Along with the support and action of these lead agencies, private sector stakeholders that share interest in traffic safety are critical partners in Vision Zero efforts.

“We can’t view traffic safety as solely a government issue. Vision Zero emphasizes motorists’ responsibility to drive safely…buckle up, drive sober, pay attention, and obey the law. Prevention of traffic deaths is every North Dakotan’s responsibility.”

— Governor Doug Burgum

State Agencies Partner to Launch Vision Zero Traffic Safety Initiative

“Even one life lost on North Dakota roads is unacceptable. Zero deaths is not an impossible goal, but it will take all of us to get there.”

— Tom Sorel, NDDOT Director
Vision, Mission, and Goals

A key first step in the safety planning process involves identifying the vision, mission, and goals for the reduction in the number of fatalities and serious injuries. North Dakota’s adopted vision provides clear strategic direction for the updated plan: Establish a culture of personal responsibility where motor vehicle fatalities and serious injuries are recognized as preventable and not tolerated.

North Dakota’s Vision Zero mission statement provides insight about how the vision will be achieved: Eliminate fatalities and serious injuries caused by motor vehicle crashes.

North Dakota’s short-term goal is to reduce annual motor vehicle crash fatalities to fewer than 75 by 2025.

An increase in the rate of reduction of crash-related fatalities requires NDDOT to improve the efficiency of safety investments – implementation of more effective safety strategies, selection of more at-risk locations for safety investments, and adoption of new safety-related policies that are proven to support increased crash reduction.

The current fatality trend (Figure 2-1) is on a downward 1% per year slope that would reach 118 fatalities in 2025. To reach North Dakota’s goal of fewer than 75 fatalities by 2025 would require increasing the rate of crash reduction from 1% to approximately 4.6% annually. To accomplish this, new bold and proven strategies must be implemented.

Figure 2-1. North Dakota Fatality Trend (with extrapolated line to 75 fatalities in 2025 and then 0)

Historic
Continuation of 2009-2016 Trend
3.75% Annual Reduction Trend

Source: NDDOT, 2017
VISION ZERO UPDATE PROCESS

The North Dakota Vision Zero Plan process builds upon experience gained and lessons learned from previous North Dakota SHSP development efforts. This Section 3 summarizes the background and process overview, federal requirements, safety stakeholder collaboration, and key program accomplishments since the previous 2013 North Dakota SHSP.

BACKGROUND AND PROCESS OVERVIEW

The SHSP is a statewide, data-driven, multiyear safety plan that provides a comprehensive framework for reducing serious crashes. The SHSP is a key requirement of the HSIP, which is a core Federal-aid program to reduce fatalities and serious injuries on all public roads. The NDDOT Safety Division also receives federal funding through the National Highway Traffic Safety Administration (NHTSA) to support driver behavior-related safety strategies to complement the infrastructure-related strategies supported by HSIP funds. Development of North Dakota’s SHSP is led by NDDOT in cooperation with local, regional, state, federal, tribal, academic, non-profit, and private-sector safety partners and stakeholders. The SHSP focuses on critical safety needs and guides investment decisions to support strategies or countermeasures proven to save lives.

The first North Dakota SHSP was adopted in 2006. Shortly thereafter, North Dakota’s 2008 oil boom sparked increases in population, commercial vehicle traffic, and vehicle miles traveled, which culminated in increased motor vehicle crash fatalities. Consequently, the North Dakota SHSP was updated in 2013 (CH2M, 2013) with an intensified commitment to both strengthen safety stakeholder engagement and to further invest in proven, evidence-based safety strategies to reduce North Dakota’s serious crashes.

In 2018, the North Dakota Vision Zero initiative was launched and the SHSP became the North Dakota Vision Zero Plan. The process began with a program assessment of North Dakota’s previously implemented infrastructure and driver behavior-related safety countermeasures to gain understanding of their comprehensiveness, how they reflected evidence-based or proven safety approaches, and to identify what changes should be considered during the update process. Figure 3-1 illustrates the core components or overview of North Dakota’s SHSP update process.
A data-driven, collaborative approach supported the above core components and integrated the perspectives of diverse safety stakeholders across the state throughout the plan’s update process. This was accomplished through:

- **A comprehensive analysis of North Dakota’s crash data** including 5 years (2012-2016) of crash data from state and local road systems, with a focus on the most serious crashes; those that resulted in fatalities and serious injuries. The resulting crash analysis examined the characteristics of the road system to support the prioritization of crash types (emphasis areas where large numbers of crashes represent the greatest opportunity for crash reduction) and facility types (description of the types of roads where the priority crash types are over-represented). Crash data analysis results, together with evidence-based strategy information, supported the selection of priority safety strategies.

- **Early and extensive safety stakeholder outreach and collaboration** including an initial kickoff webinar, crash data webinar, Emphasis Area Team input to initial safety strategies, six regional stakeholder workshops, and a post-regional workshops’ Vision Zero leadership debriefing on selected priority strategies and interim goals. More specifics on the stakeholder outreach is described later in this section.

### FEDERAL REQUIREMENTS

The Federal Fixing America’s Surface Transportation or FAST Act continues state SHSP requirements initiated under the Moving Ahead for Progress in the 21st Century (MAP-21) Act. In March 2016, the Federal Highway Administration (FHWA) issued the Strategic Highway Safety Plan (SHSP) Guidance (FHWA, 2016) to further clarify state SHSP requirements. The following summarizes each Federal SHSP requirement and references the corresponding update text.

- **A Consultative Approach:** States must develop their safety plans in consultation with a variety of stakeholders, including state and local; law enforcement, engineering, educators, and emergency responders. Consultation involves active participation by multidisciplinary safety stakeholders and sharing of safety data. See pages 3-4 to 3-7 in Section 3 for a detailed description of North Dakota’s consultative approach.

- **Coordination with Other Plans:** The SHSP provides strategic direction for state safety plans including HSIP, the Highway Safety Plan, and the Commercial Vehicle Safety Plan and aligns with other long-range transportation and metropolitan plans as well as tribal safety plans, all supporting a performance-based highway safety program.
Strategic Highway Safety Plan Update 2018-2023

Data-Driven Prioritization: Safety planning reflects a multi-level prioritization exercise that uses the results of analyzing crash data to support:

- Screening of crash types to identify areas of emphasis.
- Screening of safety countermeasures or strategies based on documented, proven effectiveness to generate an evidence-based short list of high-priority strategies.
- Identification of roadway types where implementation of the high-priority safety strategies would be expected to result in the greatest reduction in serious crashes.

Consideration of Additional Safety Factors: Additional factors to be considered when defining safety emphasis areas and safety strategies include findings of Road Safety Audits, locations of fatalities and serious injuries, rural road safety, bicycle and pedestrian serious crashes, and the results of systemic risk assessments.

Performance-Based Approach: SHSP’s are required to document the state’s adopted performance-based goals including a short-term target and long-term vision (Section 2). In addition, as part of the performance-based program, states are required to set annual safety targets that align with the SHSP’s long-term goals.

Effective Strategies/Countermeasures: Priority will be given to safety strategies/countermeasures that have been proven to be effective at reducing crash-related fatalities and serious injuries for the priority safety emphasis areas. Consideration should also be given to low-cost strategies/countermeasures that can be widely deployed at high-risk locations.

Special Requirements: Legislation requires states to address two special rules in SHSP updates: a) define High Risk Rural Roads (HRRR), and b) develop strategies to address older driver and pedestrian safety, if there has been an increase in fatalities and serious injuries to older drivers and pedestrians.

SHSP Evaluation: States must regularly evaluate their safety programs, using current safety data to confirm the validity of emphasis areas, strategies/countermeasures, and progress toward adopted interim goals. The SHSP must define mechanisms for tracking SHSP implementation and monitoring progress, including an evaluation and update schedule.

SHSP Update: The SHSP must be updated no later than 5-years from the previous approved version and meet update requirements and approvals.

Approval of SHSP Update: FHWA Division Office approves the process used to update SHSPs and not specific content. To support FHWA’s review, the SHSP must include a chapter/section(s) describing the development process.

The North Dakota SHSP Update process addresses Federal SHSP requirements as described in the referenced sections.
STAKEHOLDER COLLABORATION – A CONSULTATIVE APPROACH

During planning and development of the Vision Zero Plan, a diverse group of safety stakeholders were engaged across the state to provide critical input. Stakeholders included safety stakeholders representing the 4 Es of safety as well as non-traditional partners, such as commercial vehicle representatives, tribal governments, judicial staff, and non-motorist groups. Further, special outreach to local and state elected officials helped to encourage their participation in the Vision Zero update process.

Figure 3-2 depicts the structure of the coordination process between stakeholders and Vision Zero or SHSP project team. Through a consultative approach and facilitated engagement, participants shared valuable feedback on local application of current safety strategies and their local/regional experiences regarding priority North Dakota safety needs, proven strategies, and best practices to carry forward in the Vision Zero update.

Figure 3-2. Structure of the Coordination Process Between Stakeholders and Vision Zero or SHSP Project Team

Comprehensive Safety Stakeholders

The following stakeholder safety groups represents the agencies and organizations involved in the Vision Zero update process:

- Education Institutions and community outreach – state, local.
- Enforcement – state, county, city.
- Engineering – state, county, city, consultants.
- Emergency Medical Services – public, private.
- Federal partners – NHTSA and FHWA.
- Governor’s Highway Safety Representative.
- Insurance agencies.
- Supreme Court Chief Justice, District Judges, state and private attorneys/county prosecutors.
- Local community representatives/private citizens.
- Military representative – Air Force.
- Motor Vehicle Administration.
- Non-motorist representation – pedestrian, bicycle and transit.
- Public health and human services staff – state, county, city.
- Elected officials – state, county, city.
- Motor carrier representatives – federal, state.
- Rail representation – Operation Lifesaver.
- Road maintenance – state, county, city.
- Tribal representatives: leadership, transportation, education.
- Traffic safety advocacy groups.
- Transportation Planning – state, regional, MPO, county, city, consultants.
STAKEHOLDER COLLABORATION PROCESS

A cross-section of multidisciplinary stakeholders participated in several outreach events throughout the Vision Zero Plan process as illustrated in Figure 3-3. The stakeholders provided valuable guidance to updating the Vision Zero Plan through open dialogue at direct in-person meetings, workshops, and webinars. Stakeholder engagement events are described in the following section.

Figure 3-3. Stakeholder Engagement Approach

ENGAGEMENT EVENTS

Several safety stakeholder engagement opportunities were available throughout the Vision Zero update process and are detailed below.

Vision Zero/SHSP Kickoff Webinar – March 13, 2018

Members of the Vision Zero Executive Leadership Team and the Vision Zero Steering Committee were invited to participate in the March 2018 kickoff webinar. The two groups were solicited early in the update process to offer valuable perspectives on the approach and provide recommendations. During the kickoff webinar, participants were debriefed on the update process and federal requirements, the newly launched Vision Zero program, and the Vision Zero Safety Workshop implementation beginning March through April 2018. Members were invited to provide their perspectives on the Vision Zero update process.

Solicitation of Vision Zero/SHSP Safety Emphasis Area Team Input

The North Dakota Vision Zero Emphasis Area Teams representing the four behavioral and two infrastructure priority safety emphasis areas served a key role throughout the Vision Zero update. The Emphasis Area Teams identified priority needs, framed challenges, identified safety strategies, recommended priorities, and will play a central role in strategy implementation.

Prior to the Vision Zero safety workshops, leaders of the emphasis area teams (together with NDDOT safety staff) offered their expertise to create initial emphasis area safety strategies based on North Dakota crash data, knowledge of proven safety counter measures, and experience with North Dakota safety culture. Their input on the initial strategies strengthened the statewide context for the regional Vision Zero safety workshop discussions, presentations, and materials.
Regional *Vision Zero* One-Day Safety Workshops

North Dakota selected six regional locations across the state to host the one-day safety workshops, as presented in Figure 3-4, which were held in March and April 2018. The primary goals of the *Vision Zero* Safety Workshops were to solicit safety stakeholder input and perspectives and educate stakeholders on proven safety strategies. The regional workshop approach versus a single statewide workshop provided a greater opportunity to gain unique perspectives among regional stakeholders and to help align local needs with statewide safety priorities.

Table 3-1 outlines the dates and locations for each workshop. A copy of the invitation sent to stakeholders is presented in Appendix A.

**Workshop Agenda**

The six *Vision Zero* Safety Workshops (Figures 3-5 and 3-6) occurred over 7 hours and included the following agenda components (included in Appendix B):

- **Foundational presentations on the North Dakota *Vision Zero* initiative and an overview of the North Dakota SHSP/*Vision Zero* background and update process.**
- **A review of the importance of a data-driven safety approach and an overview of North Dakota’s serious crash data and priority emphasis areas.**
- **Stakeholder discussion of priority regional safety needs and successes.**
- **Infrastructure and behavioral emphasis area strategy presentation and stakeholder discussions, focusing on proven, evidence-based strategies. Participants had the opportunity to recommend new strategies and modify existing strategies.**
- **Stakeholder voting on priority safety strategies based on crash data, evidence-based strategies and best practices, multidisciplinary input, and local/regional perspectives.**

North Dakota chose a full-group discussion format for infrastructure and behavior-related safety strategies versus a structure using separate breakout discussions for each. The full-group discussion approach promoted cross-education of effective strategies and interdisciplinary discussion offering the sharing of diverse perspectives resulting in a more comprehensive understanding of safety approaches among all stakeholders.

In addition, each workshop provided an opportunity to include local/regional speakers to highlight local safety accomplishments.
Each participant received the following printed supporting material, which are presented in Appendix B:

- Vision Zero Safety Workshop agenda.
- Presenter biographies.
- Workshop-specific participant list (not included).
- Workshop presentation.
- Emphasis area table of statewide injuries.
- Emphasis area crash fact sheets (see Appendix C).
- Emphasis area strategy tables.

**Priority SHSP Safety Strategy Review and Comment**

Following the Vision Zero Safety Workshops, the Vision Zero Executive Leadership Team and Steering Committee members met on May 24, 2018 to review workshop stakeholder discussion and safety strategy input and provide initial comment and feedback on recommended priority safety strategies for each of the six priority emphasis areas. Members were provided one-page summaries of the emphasis areas with highlights of North Dakota crash data analyses, fatalities, and serious injury trends from 2008-2016. The one-page summaries also included the recommended priority safety strategies, reflecting, in part, input from the Vision Zero Safety Workshops. The meeting discussion recapped the Vision Zero Update process, stakeholder input received, emphasis area priority safety strategies, potential policy-related efforts, and the Vision Zero Update interim goal. In addition, Vision Zero leadership members were invited to further consider the recommended priority safety strategies and offer additional feedback by June 7, 2018.

**STAKEHOLDER PARTICIPATION SUMMARY**

Statewide outreach efforts included inviting more than 2,000 stakeholders, of which, more than 200 participated in emphasis area strategy formation, two webinars, six Vision Zero Safety Workshops, and priority strategy selection. Stakeholder comments were carefully reviewed and considered for the Vision Zero Update. In addition, during the workshops, participants were invited to sign up for North Dakota Vision Zero Behavioral Emphasis Area Teams to expand the statewide participation in Vision Zero strategy development and implementation. More than 60 additional members were added to the behavioral emphasis area teams, including Young Driver, Unbelted Occupants, Alcohol and/or Drug Use, and Speeding/Aggressive Driving.
DATA-DRIVEN PRIORITIZATION

As part of the Vision Zero Plan’s analytical process, it is essential to use a data-driven approach to determine appropriate candidates for safety investment because, in the absence of data, crash types and roadway facilities could be misconceived as equal candidates for safety investment. Therefore, FHWA requires the Vision Zero Plan development process be data driven to avoid misconceptions. Crash type data and roadway system characterization are necessary to support the prioritization that is an integral part of strategic safety planning.

For North Dakota, the crash data analyses involved four steps. The first step includes disaggregating crash types into categories defined by FHWA and then ranking the categories based on the number of fatalities and serious injuries. Since there is not enough safety funding to widely deploy projects that address all crash types, states are encouraged to adopt a short list of safety emphasis areas from among the categories with the greatest number of crashes. Focusing safety investments in the top ranked emphasis areas (those with the greatest number of fatalities and serious injuries) is most likely to result in the greatest opportunity for crash reduction.

The second step is identifying high-priority safety countermeasures/strategies that are linked to specific crash types. The third step is analyzing crash data to identify the types of roadway facilities where the priority crash types occur in the greatest numbers. The fourth and final step is to develop a historic trend of fatalities and serious injuries to indicate the progress North Dakota has made in addressing the number of priority crash types. The trend should also document total fatalities across the country to provide a comparison to nationwide priority crash types.

SAFETY EMPHASIS AREAS

Consistent with FHWA guidance (FHWA, 2016), North Dakota has adopted the number of motor vehicle crash fatalities plus incapacitating injuries (serious injuries) as the safety performance measure underlying the development of this Vision Zero Plan. Crash data from the most recent 5-year period (2012-2016) were assembled, analyzed, and disaggregated into four basic categories (Drivers and Passengers, Vulnerable Users, Vehicles, and Infrastructure) and 15 safety emphasis areas (as suggested by FHWA). In addition to disaggregating by emphasis area, serious injuries were disaggregated by state versus local system roadways. The number of injuries documented are greater than the actual number of fatalities and injuries across the state’s road system because assigning crashes to these categories involves, in many cases, double or triple counting. For example, a single crash that resulted in an injury to a Young Driver could also have involved Speeding, Unbelted Occupants, and a Lane Departure/Single-Vehicle crash.

The results of the analysis support the adoption of the following as Priority Safety Emphasis Areas:

1. Lane Departure.
2. Intersections.
3. Alcohol and/or Drug Related.
5. Speeding/Aggressive Driving.
6. Young Drivers.

Fact sheets summarizing key information for each adopted Priority Safety Emphasis Area are included in Appendix C.
Based on the number of serious injuries and increasing crash trends, North Dakota supports five Other Areas of Emphasis in addition to the Priority Safety Emphasis Areas including:

1. Heavy Vehicle.
2. Older Drivers.
3. Pedestrians/Bicyclists.
4. Local System Roadways.
5. Oil-Impact Counties.

To gain a better understanding of the relationships among the emphasis areas, further analysis was conducted and the results are in Table 4-1. Key takeaways from this effort include (NDDOT, 2017):

- 42% of serious injuries to Young Drivers are associated with Speeding/Aggressive Driving.
- 48% of serious injuries to Older Drivers are associated with Intersection related crashes.
- 63% of Alcohol and/or Drug related serious injuries involve Unbelted Vehicle Occupants.
- 32% of serious injuries to pedestrians are Alcohol and/or Drug related.
- 54% of serious injuries to bicyclists are Intersection related.
- 30% of serious injuries to motorcyclists are Intersection related.
- 67% of serious injuries associated with Heavy Vehicle crashes occurred in Oil-Impact Counties.
- 49% of serious injuries involving Lane Departure are associated with Speeding/Aggressive Driving.
- 57% of serious injuries associated with Multi-Vehicle Opposing (Head-On) crashes occurred in the Oil-Impact Counties.
- 56% of serious injuries associated with Winter Weather conditions occurred in the Oil-Impact Counties.

As part of the data-driven prioritization process, crash trees were developed to document a disaggregation by state (Figure 4-1) versus local (Figure 4-2) system roadways and urban versus rural areas. Key takeaways from this effort include (NDDOT, 2017):

- A total of 48% of serious injuries occurred on state system roadways and 52% on local system roadways.
- Majority of serious injuries occurred in rural areas (92% on the state system and 67% on the local system).
- The most common type of crash resulting in serious injuries in rural areas on both state and local system roadways is a non-intersection, single-vehicle lane departure, on a tangent (straight) section of road with Unbelted Vehicle Occupants.
- In rural areas, approximately 25% of crashes involving serious injuries occurred in curves and this is considered over-represented based on an estimate that curves make up fewer than 5% of state and local system roadways based on mileage.
- In rural areas, approximately 1% of crashes involving serious injuries are associated with animal hits (primarily deer).
- In urban areas, crashes involving serious injuries are almost evenly divided on state and local systems between intersections and non-intersections.
- In urban areas, approximately 30% of crashes involving serious injuries occurred at intersections with traffic signal control (57% on the state system and 24% on the local system) and this is considered over-represented based on an estimate that signal-controlled intersections make up fewer than 10% of all intersections.
The emphasis area matrix is a powerful tool for identifying relationships and correlations between emphasis areas, which can be critical information in selecting appropriate highway safety strategies. It presents a cross table of emphasis area representation, with the column headers on the top of the table representing the target emphasis area, and the index headers on the left of the table representing the related emphasis area. The cells in the table represent the total percentage of crashes within the target emphasis area which are also identified as being within the related emphasis area.

To read the matrix, consider the following:

- Identify a target emphasis area from the column headers at the top of the matrix. This emphasis area will be the focus of the analysis.
- Identify a related emphasis area from the index headers at the left of the matrix. This emphasis area will identify a subset of the target emphasis area.
- Identify the cell which is within the selected column and the selected row. The value in this cell indicates the percent share, which is the size of the subset of the target emphasis area which the related emphasis area represents.
- Use the identified values to fill in the following sentence: "Of all target emphasis area crashes, percent share of them also fall within the related emphasis area."

### Table 4-1. Safety Emphasis Area Correlation Matrix

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<th>Young Driver</th>
<th>Older Driver</th>
<th>Speeding/Aggressive Driving</th>
<th>Alcohol and/or Drug Related</th>
<th>Distracted/Asleep/Fatigued</th>
<th>Unbelted Vehicle Occupants</th>
<th>Pedestrian</th>
<th>Bicyclist</th>
<th>Motorcycle</th>
<th>Heavy Vehicles</th>
<th>Train</th>
<th>Lane Departure: Single-Vehicle</th>
<th>Lane Departure: Multi-Vehicle (Opposing Traffic)</th>
<th>Lane Departure: Multi-Vehicle (Same Direction)</th>
<th>Intersection</th>
<th>Winter Weather</th>
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Strategic Highway Safety Plan Update 2018-2023
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<td>4/25%</td>
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<tr>
<td>LD-SV</td>
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<td>22</td>
<td>13%</td>
<td>1/6%</td>
</tr>
<tr>
<td>NM</td>
<td>40</td>
<td>24%</td>
<td>6/25%</td>
</tr>
</tbody>
</table>

**Figure 4-1. North Dakota Statewide Crash Tree/State System**

*Crash Type Codes:
- **AG**: High (3 or more passenger vehicles)
- **RA**: Right Angle
- **HO**: Head On
- **DO**: Double
- **LB**: Losing Control
- **Al**: Alcohol
- **SP**: Speeding/Airborne
- **LD-MV**: Lane Departure: Multi-Vehicle
- **NM**: Non-Motorized

Refer to associated documentation for updated definitions of categories used herein.

1 Source: NDDOT Crash Database, Retrieved 12/22/2017; 2012-2016
2 Percentages may not add up to 100%
### Crash Type Codes

- **AG**: Angle (not specific)
- **AL**: Alcohol
- **AV**: Driver
- **GA**: General/Other
- **HD**: Head-On
- **PF**: Pedestrian
- **PL**: Peds/Animals
- **SP**: Speeding/Aggressive
- **SR**: Driver/Other
- **SU**: Lane Departure: Single-Vehicle
- **SV**: Lane Departure: Multi-Vehicle
- **UB**: Unbuckled
- **YO**: Young Driver

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<th>Other/Unknown</th>
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<tr>
<td>AG 91</td>
<td>486 32%</td>
<td>506 34%</td>
<td>23 10%</td>
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<tr>
<td>RA 480 24%</td>
<td>469 32%</td>
<td>X 22%</td>
<td>X 5%</td>
</tr>
<tr>
<td>HO 117 4%</td>
<td>45 3%</td>
<td>7 3%</td>
<td>X 21%</td>
</tr>
<tr>
<td>RD 465 22%</td>
<td>RE 194 13%</td>
<td>7 8%</td>
<td>X 11%</td>
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<td>YD 610 30%</td>
<td>YD 886 32%</td>
<td>X 24%</td>
<td>X 19%</td>
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<td>OD 414 20%</td>
<td>OD 203 10%</td>
<td>X 20%</td>
<td>X 11%</td>
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<tr>
<td>UB 293 14%</td>
<td>UB 209 14%</td>
<td>X 11%</td>
<td>X 10%</td>
</tr>
<tr>
<td>AL 156 7%</td>
<td>AL 103 7%</td>
<td>X 12%</td>
<td>X 11%</td>
</tr>
<tr>
<td>SP 426 21%</td>
<td>SP 293 10%</td>
<td>X 20%</td>
<td>X 11%</td>
</tr>
<tr>
<td>LD-MV 33</td>
<td>LD-MV 62 4%</td>
<td>X 12%</td>
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</tr>
<tr>
<td>LD-MV 288</td>
<td>LD-MV 165 31%</td>
<td>X 18%</td>
<td>X 10%</td>
</tr>
<tr>
<td>LD-MV 51</td>
<td>LD-MV 9 3%</td>
<td>X 4%</td>
<td>X 1%</td>
</tr>
<tr>
<td>NM 137 7%</td>
<td>NM 93 6%</td>
<td>X 5%</td>
<td>X 4%</td>
</tr>
</tbody>
</table>

### Figure 4-2. North Dakota Statewide Crash Tree/Local System

- **North Dakota Statewide Crash Tree/Local System**

- Crash Type Codes:
  - **AG**: Angle (not specific)
  - **AL**: Alcohol
  - **AV**: Driver
  - **GA**: General/Other
  - **HD**: Head-On
  - **PF**: Pedestrian
  - **PL**: Peds/Animals
  - **SP**: Speeding/Aggressive
  - **SR**: Driver/Other
  - **SU**: Lane Departure: Single-Vehicle
  - **SV**: Lane Departure: Multi-Vehicle
  - **UB**: Unbuckled
  - **YO**: Young Driver

- **Signalized**: 2,050 (31%)
- **Unsignalized**: 1,506 (23%)
- **Other/Unknown**: 2,963 (45%)

- **State System**
  - Total Injuries: 3,511
  - Serious Injuries: 2,050

- **Urban**: 12,630 (78%)
- **Rural**: 5,180 (30%)

- **Intersection Related**: 3,511 (46%)
- **Non-Intersection Related**: 1,426 (27%)

- **Signalized**: 41 (3%)
- **Unsignalized**: 80 (24%)
- **Other/Unknown**: 197 (60%)

- **Version 0.1, Printed 7/11/2018**

- Crash Type 2 Codes:
  - **AG**: Angle (not specific)
  - **AL**: Alcohol
  - **AV**: Driver
  - **GA**: General/Other
  - **HD**: Head-On
  - **PF**: Pedestrian
  - **PL**: Peds/Animals
  - **SP**: Speeding/Aggressive
  - **SR**: Driver/Other
  - **SU**: Lane Departure: Single-Vehicle
  - **SV**: Lane Departure: Multi-Vehicle
  - **UB**: Unbuckled
  - **YO**: Young Driver

- **On-Curve**: 402 (37%)
- **Off-Curve**: 1,159 (93%)

- **Animal**: 46 (1%)
- **Non-Animal**: 3,718 (99%)

- **Refer to associated documentation for detailed definitions of categories used herein.**

- **Crash Type 2**: 2,050

- **5-Year Crashes**: 26,345

- ** Sacrifice: 1,294

- **9,125**
  - **65%**
  - **1,199**
  - **52%**

- **12,000**
  - **79%**
  - **1,398**
  - **90%**

- **17,200**
  - **65%**
  - **1,048**
  - **70%**

- **2,900**
  - **95%**
  - **417**
  - **60%**

- **Figure 4-2. North Dakota Statewide Crash Tree/Local System**

- **Interstate Related**: 1,744 (27%)
  - **Unsignalized**: 228 (35%)
  - **Other/Unknown**: 105 (7%)
  - **Signalized**: 840 (49%)

- **Intersection Related**: 2,050
  - **Unsignalized**: 228 (21%)
  - **Other/Unknown**: 105 (5%)
  - **Signalized**: 840 (40%)

- **Example**
  - **AV**: Alcohol
  - **SR**: Driver/Other

- **1 Source: NDDOT Crash Database, Retrieved 12/22/2017; 2012-2016**

- **Crash Data**
  - **Signaled**: 2,050 (31%)
  - **Unsignalized**: 1,506 (23%)
  - **Other/Unknown**: 2,963 (45%)

- **Urban**: 12,630 (78%)
  - **Rural**: 5,180 (30%)

- **Intersection Related**: 3,511 (46%)
  - **Non-Intersection Related**: 1,426 (27%)

- **Signalized**: 41 (3%)
  - **Unsignalized**: 80 (24%)
  - **Other/Unknown**: 197 (60%)

- **Version 0.1, Printed 7/11/2018**

- **Strategic Highway Safety Plan Update 2018-2023**

- **Version 0.1, Print 7/11/2018**
SAFETY STRATEGIES

Adoption of the six Priority Safety Emphasis Areas and five Other Areas of Emphasis began the prioritization/screening process of safety strategies. The process started with a review of safety research reports including:

- FHWA’s Crash Modification Factor (2014).
- NHTSA’s Countermeasures that Work (NHTSA, 2015).

Focusing on adopted emphasis areas reduced the number of infrastructure and driver-behavior safety strategies from more than 700 to around 140.

The initial list of infrastructure and driver-behavior-based safety strategies is included in Appendix B. The selected high-priority, evidence-based safety strategies associated with each of the adopted emphasis areas are documented in Chapter 5 of this Vision Zero Plan and include:

- Lane Departure.
  - Enhanced road edges.
  - Designating and deploying safety corridors.
- Intersections.
  - Improve intersection recognition by enhancing traffic control devices and adding street lights.
  - Reduce intersection conflicts by implementing design improvements, including roundabouts and Restricted Crossing U-Turns along divided roadways.
  - Address red-light running at urban signalized intersections through confirmation lights and partnerships with local law enforcement.

- Alcohol and/or Drug Use.
  - Implement an ignition interlock program.
  - Enhance alcohol and/or drug related driving detection through expanded enforcement and sobriety checkpoints.
- Unbelted Vehicle Occupants.
  - Enact primary seat belt legislation.
  - Strengthen penalties for lack of seat belt use.
- Speeding/Aggressive Driving.
  - Enact legislation to increase fines for speed violations.
  - Explore pilot automated enforcement projects.
- Young Drivers.
  - Enhanced graduated drivers licensing.
  - Enhanced monitoring of teen driving.

CRASH DATA TRENDS

While 5-years of crash data were sufficient to identify priorities, they were not sufficient to develop trend indicating changes in the number of motor vehicle crash fatalities and serious injuries over time. As a result, the data set was expanded to 8 years (2009-2016) and the results of this effort are documented in Table 4-2 and Figure 4-3. The data indicate the following about crashes in North Dakota during this 9-year period. County fatalities for 2012-2016 are documented in Appendix D.

- An average of 119 fatal crashes per year and 507 serious injury crashes per year.
- An average of 136 fatalities per year and 607 serious injuries per year.

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<td>17,132</td>
<td>18,840</td>
<td>18,381</td>
<td>18,989</td>
<td>16,142</td>
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<td>745</td>
<td>665</td>
<td>653</td>
<td>686</td>
<td>545</td>
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<td></td>
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<td>5,490</td>
<td>5,524</td>
<td>5,429</td>
<td>5,133</td>
<td>4,769</td>
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Table 4-2. North Dakota Summary of Injuries versus Crashes by Severity and Year (NDDOT, 2017)
There are approximately 1.1 fatalities per fatal crash and 1.2 serious injuries per injury crash.

Fatalities and serious injuries increased from 2009 through 2012 and then decreased to 2016. However, the overall trend shows a decrease of about 1% per year for fatalities and an increase of 4% per year for serious injuries.

North Dakota’s fatalities trend is relatively flat, like the national trend (Figure 4-4). However, the exception between the two trends is that the most recent 5 years of fatalities are trending down in North Dakota and are trending up at the national level.

The data-driven analysis determined that serious crashes and the resulting fatalities and injuries were over-represented in the Oil-Impact Counties (the seventeen counties that make up the northwestern portion of North Dakota). These counties have experienced significant growth from a traffic volume and economic development perspective because of activity associated with crude oil extraction from the Bakken Formation. These Oil-Impact Counties saw traffic volumes more than double between 2009 and 2014 and the statewide fraction of serious crashes increased from around 30% to more than 50%.

The Oil-Impact Counties trend since 2009 (Figure 4-5) shows an overall increase of serious injuries of around 8% per year. However, there are two distinctly different patterns. Between 2009 and 2012 serious injuries increased at a rate of 20% per year and between 2012 and 2016 serious injuries decreased at a rate of 14% per year. Since the oil boom began, considerable investment has been made in the area, including expansion of the state’s roadway system and implementation of a variety of safety improvements. Since 2012, oil extraction activities have diminished due to the reduction in the worldwide price of crude oil, but it is too soon to tell exactly what is behind the substantial reduction in serious injuries in the Oil-Impact Counties.
Review of North Dakota’s annual number of fatalities and serious injuries shows relatively large fluctuations on a year-to-year basis. FHWA encourages states to plot 5-year rolling averages to provide a general trend with additional insight to support the selection of short-term goals for the reduction of serious injuries.

The 5-year rolling average trend of fatalities in North Dakota and nationally (Figure 4-6) shows results similar to those identified on a year-by-year analysis; flat trend with the North Dakota numbers trending slightly down and the national numbers trending slightly up.

Analysis of North Dakota’s crash data indicate the following (NDDOT, 2017):
- Among the Priority Safety Emphasis Areas, the trends for Unbelted Occupants, Speeding/Aggressive Driving, Alcohol and/or Drug Related, Intersections, and Young Drivers (Figure 4-7) have decreased between 6% and 11% per year. The trend for Lane Departure is flat (Figure 4-8).
- Among the Other Areas of Emphasis, the trends for Heavy Vehicles, Older Drivers (Figure 4-9), Pedestrians/Bicyclists, Local System Roadways, and Oil-Impact Counties have increased between 1% and 9% per year.
CRASH AND INJURY RATES

The analytical process includes normalizing the number of fatalities and serious injuries based on the amount of travel across the state and the result is expressed as a rate of fatalities or serious injuries per 100 million vehicle miles traveled (HMVMT). The data reveal a similar pattern for fatalities, serious injuries, the amount of travel across the state and rates. From 2009 to 2012, all statistics increased but by 2016 had dropped back to values that were still somewhat higher than in 2009 for the total number of serious injuries and vehicle miles traveled and somewhat lower than in 2009 for fatalities and serious injury rates (Table 4-3). As was the case for the trends for fatalities and serious injuries, the trend for rates show two different patterns. A distinct increase in rates between 2009 and 2012 followed by a distinct decrease in rates between 2012 and 2016.

Crash and injury rates were also documented for the classes of roadways that define North Dakota’s HRRR (Table 4-4). In North Dakota, HRRRs are any roadway functionally classified as a rural collector or rural local road with a crash rate for fatalities and serious injuries that exceeds the statewide average for those facilities or that will likely have increases in traffic volumes that would result in crash rates that exceed the statewide average rates. The average fatality and injury rates (per HMVMT) for rural collectors and rural local roads are 0.83, 2.46, 0.99, and 3.78, respectively.

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**Table 4-3. Statewide Annual Comparison of Serious Injury Frequency versus Serious Injury Rate (NDDOT, 2017)**

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<td>Fatal (K)</td>
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<td>148</td>
<td>170</td>
<td>148</td>
<td>135</td>
<td>131</td>
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<td>Serious (K+A)</td>
<td>470</td>
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<td>653</td>
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<td>545</td>
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<td><strong>Injury Rate per HMVMT</strong></td>
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<td>Fatal (K)</td>
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<td>83.026</td>
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<td>104.366</td>
<td>100.791</td>
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**Table 4-4. Injury Rates for High Risk Rural Roads**

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<td></td>
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<tr>
<td>Fatal (K)</td>
<td>22</td>
<td>6</td>
<td>4</td>
<td>12</td>
<td>8</td>
<td>1</td>
<td>10</td>
<td>5</td>
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<tr>
<td>Serious (K+A)</td>
<td>34</td>
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<td>24</td>
<td>31</td>
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<tr>
<td><strong>Injury Rate per HMVMT</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatal (K)</td>
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<td>0.686</td>
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<td>0.660</td>
<td>0.078</td>
<td>0.816</td>
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<td>Serious (K+A)</td>
<td>3.948</td>
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<td>1.816</td>
<td>1.166</td>
<td>2.938</td>
<td>2.072</td>
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SECTION 5
Priority Safety Strategies for Safety Emphasis Areas
INTRODUCTION

A key part of the data-driven prioritization process for a strategic safety plan is identifying high-priority, evidence-based safety countermeasures/strategies for each adopted safety emphasis area. This approach is based on three important points.

1. Safety countermeasures/strategies are aligned with specific emphasis areas.
2. Safety countermeasures/strategies are not equally effective at reducing crashes. As state’s screen for potential countermeasures/strategies, an awareness of historic crash reduction is an important consideration.
3. Experience suggests that developing safety projects from a short list of highly effective strategies is more efficient and effective because there is not enough safety funding for an extensive list of strategies. Therefore, investing in proven, effective strategies will likely result in greater crash reductions.

North Dakota’s crash data identified six crash types based on the total number of serious injuries (fatalities plus serious injuries) during the 2012-2016 study period. Investment in these priority safety emphasis areas would represent the greatest opportunity for crash reduction. The adopted Priority Safety Emphasis Areas are detailed below and are represented in annual averages (NDDOT, 2017):

- Lane Departure (381 serious injuries/year and 58% of serious injury crashes).
- Intersections (191 serious injuries/year and 29% of all serious injury crashes).
- Alcohol and/or Drug Related (218 serious injuries/year and 33% of all serious injury crashes).

The high-priority safety countermeasures/strategies in the following priority safety emphasis areas are the result of a screening process that began with more than 140 strategies from a variety of safety research reports (NCHRP Report 500 Series [2017], FHWA’s Crash Modification Factor website [2014], the Highway Safety Manual [MnDOT, 2014], and NHTSA’s Countermeasures That Work [2015]). These strategies were evaluated based on documented crash reduction, estimated implementation costs, consistency with North Dakota’s safety culture, and feedback from approximately 200 North Dakota safety partners that participated in a series of safety workshops conducted around the state.

In addition to the adopted priority safety emphasis areas, North Dakota will focus safety investments on five Other Areas of Emphasis, including (NDDOT, 2017):

- Unbelted Vehicle Occupants (320 serious injuries/year and 48% of all serious injury crashes).
- Speeding/Aggressive Driving (260 serious injuries/year and 39% of all serious injury crashes).
- Young Drivers (120 serious injuries/year and 18% of all serious injury crashes).
- Heavy Vehicles (120 serious injuries/year and 18% of all serious injury crashes).
- Older Drivers (76 serious injuries/year and 12% of all serious injury crashes).
- Pedestrians/Bicyclists (39 serious injuries/year and 6% of all serious injury crashes).
- Local System Roadways (340 serious injuries/year and 52% of all serious injury crashes).
- Oil-impact Counties (277 serious injuries/year and 42% of all serious injury crashes).
Heavy Vehicles, Older Drivers, and Pedestrians/Bicyclists were selected for inclusion in this SHSP because even though the number of serious injury crashes did not rise to the level of those associated with the Priority Safety Emphasis Areas, the crash trend are increasing (9% per year, 5% per year, and 4% per year, respectively). Local Road Systems and Oil-impact Counties were selected because the large number of crashes represented an opportunity for reduction and crash characteristics and associated safety countermeasures/strategies could be identified.
LANE DEPARTURE

Lane-departure crashes include single-vehicle run-off-the-road (to the right and left) crashes and multiple vehicle collisions when vehicles wander outside their lane and result in either head-on or side-swipe collisions.

On North Dakota roadways, there were 1,581 serious injury lane-departure crashes resulting in 1,906 serious injuries between 2012 and 2016. This is an average of 381 serious injuries per year and accounted for nearly 58% of serious injury crashes during the 5-year study period (NDDOT, 2017).

Highlights from the most recent data (2012-2016) for lane-departure crashes on North Dakota roadways include (NDDOT, 2017):

- Majority of these serious injuries occurred on rural (85%), state (46%), and local (39%) road systems.
- Majority of lane-departure serious injuries are from single-vehicle crashes (75%).
- Highway curve serious injuries (26%) are considered over-represented.
- The most harmful events for single-vehicle serious injuries involved overturning/rolling over (72%) and collisions with fixed objects (13%) such as trees, utility/light poles, traffic signs, and mail boxes.
- Male drivers between the age of 20 and 29 were involved in the largest number of serious injury crashes (22%).
- A plurality of Lane Departure serious injuries (31%) occurred during summer months and a majority occurred on dry roads (75%) during daylight conditions (51%).

- Unbelted Drivers and occupants accounted for more than 50% of fatalities and serious injuries.
- Alcohol and/or drug Related driving (41%) and Speeding/Aggressive driving (40%) were common contributing factors.

Priority Safety Strategies

To increase safety measures to reduce Lane Departure crashes, the following strategies should be implemented:

- Install safety corridors.
- Include longitudinal delineators.
- Embed wet reflective pavement markings.
- Install 6-inch-wide edge lines.
- Install edge and center line rumble strips.
- Add chevrons (curve warning signs).
- Implement shoulder paving (including edge-line rumble strips).
- Median barriers.

![Figure 5-1. Lane Departure Fatality and Serious Injury History](source: NDDOT, 2017)
INTERSECTIONS

Between 2012 and 2016, there were 805 serious crashes on North Dakota roadways. These resulted in 953 serious injuries in which the crash occurred at or in relation to an intersection. This is an average of 191 serious injuries per year that accounted for nearly 29% of all serious injuries during the 5-year period. Serious injuries near intersections include multi-vehicle (77%) and single-vehicle (23%) collisions. The most common types of intersection-related multi-vehicle serious injuries result from right-angle crashes (58%) and rear-end crashes (11%) that occur at STOP (23%) and signal-controlled (18%) locations (NDDOT, 2017).

Highlights from the most recent data (2012-2016) include (NDDOT, 2017):

- Majority of these serious injuries occurred on rural (59%), state (36%), and local (23%) road systems.
- Male drivers between the age of 20 and 29 were involved in the largest number of serious injury crashes (17%).
- A plurality of intersection serious injuries occurred during summer months (33%) and a majority occurred on dry roads (80%) during daylight conditions (62%).
- Unbelted drivers and occupants accounted for 41% of fatalities and serious injuries.
- Speeding (28%), alcohol (24%), and failure to yield (22%) were cited as the most common contributing factors.
- The most common type of serious injury at rural STOP controlled intersections results from a right-angle crash where the driver on the minor approach stopped and then pulled into traffic on the major approach (a gap selection issue). The most common type of serious injury at urban signal-controlled intersections results from a right-angle collision where a vehicle ran the red light.

**Priority Safety Strategies**

To increase safety measures to reduce intersection crashes, the following strategies should be implemented:

- Install roundabouts (instead of traffic signals).
- Install reduced conflict intersections.
- Install street lighting.
- Install rural intersection collision warning systems (RICWS).
- Require confirmation lights on traffic signals to support red-light running enforcement efforts.
- Require access management (near intersections).

![Figure 5-2. Intersection Fatality and Serious Injury History](source: NDDOT, 2017)
ALCOHOL AND/OR DRUG USE

Driving while impaired by alcohol and drug use poses a serious threat to drivers who operate vehicles while impaired and other motorists and road users sharing the roadway. In North Dakota, driving under the influence of alcohol and illegal or prescription drugs is a leading contributor to fatal and serious injury crashes. Yet, these types of serious crashes are 100% preventable. Although North Dakota has a general .08 BAC limit for those operating vehicles, drivers can be convicted of drunk driving even when their BAC is under that limit. The average BAC among North Dakota DUI offenders is .17 – one of the highest in the country and is more than twice the legal limit of .08. Despite aggressive DUI safety measures, the alcohol and/or drug-impaired driving problem has proved resistant to change.

On North Dakota roadways, there were 886 serious crashes resulting in 1,091 serious injuries between 2012 and 2016 in which the crash involved alcohol or drugs. This is an average of 218 serious injuries per year and accounted for 33% of all serious injuries during the 5-year study period.

Highlights from the most recent crash data (2012-2016) (NDDOT, 2017) include:

- Most alcohol and/or drug related serious injuries result from single-vehicle type crashes (66%) and most often involved a vehicle rollover (61%).
- Intersection-related angle crashes and head-on crashes account for a large portion of North Dakota’s serious injuries (25%) and pose a serious threat to other motorists.
- Younger drivers ages 20 through 29 were at highest risk for an alcohol and/or drug related serious injury at 36%.
- Of the alcohol and/or drug related serious injuries, contributing factors included Unbelted Vehicle Occupants (63%) and Speeding/ Aggressive driving (51%).
- Across all times of day, there is greater risk at night for serious injuries involving alcohol or drugs (66%).

Priority Safety Strategies

To increase safety measures to reduce Alcohol and/or Drug Use related serious injuries, the following strategies should be implemented:

- Implement an ignition interlock program (item requiring legislation to enact law [Policy]).
- Strengthen enhanced penalties for high BAC offenders (Policy).
- Maintain high visibility sobriety checkpoints.
- Conduct a comprehensive assessment of administrative licensing sanctions for both alcohol and drug-impaired driving.
- Limit the scope of administrative hearings to relevant facts and issues.
- Identify/implement approaches to effectively educate judges on DUI and drug enforcement protocol and importance of prosecuting alcohol and/or drug-impaired cases.
- Expand officer Advanced Roadside Impaired Driving Enforcement (ARIDE) training and officer use of Drug Recognition Experts (DRE).
- Strengthen prosecutor and law enforcement training on investigating and prosecuting alcohol and/or drug-impaired cases.
- Mandate alcohol server training as a condition of alcohol licensure (Policy).
- Strengthen highly publicized compliance checks and server training for alcohol retailers and merchants.

Figure 5-3. Alcohol/Drug Related Fatality and Serious Injury History

Source: NDDOT, 2017
UNBELTED VEHICLE OCCUPANTS

Buckling up is the single most effective protective measure in the event of a crash. Seat belts securely restrain occupants within the vehicle’s protective cab compartment. When lap and shoulder seat belts are used, the risk of fatal injury to front-seat passenger car occupants is reduced by 45% and the risk of moderate-to-critical injury is reduced by 50%.

Safety benefits are even greater for light-truck occupants, with seat belts reducing fatalities by 60% (Kahane, 2015).

Other seat belt safety facts include (NHTSA, 2016):

- Air bags are designed to work with seat belts, not replace them. Even without an airbag, motorists are safer buckled up than with an airbag and not buckled up; being ejected from a vehicle is nearly always deadly.
- Most fatal crashes happen within 25 miles from home and at speeds of less than 40 mph.
- Incidents involving fire or water account for one-half of 1% of all crashes. Occupants wearing a seat belt have a much greater chance of being conscious and able-bodied to safely escape.

North Dakota’s statewide driver and right-front-seat passenger seat belt use is nearly 80% (NDDOT, 2017) and is considerably less than the national average of 90% (NHTSA, 2016). On North Dakota roadways, there were 1,264 serious crashes resulting in 1,599 serious injuries between 2012 and 2016 in which the crash involved an unbelted or improperly restrained occupant. This is an average of 320 serious injuries per year and accounted for nearly half or 49% of all serious injuries during the 5-year study period.

Highlights from the most recent crash data (2012-2016) (NDDOT, 2017) include:

- Most serious injuries involving an unbelted motorist occurred on rural roads (84%) on both the state (46%) and local road (38%) systems.
- Most unbelted serious injuries result from single-vehicle type crashes (60%) and most often involve a vehicle rollover (66%) or an angle crash (20%).
- Younger drivers ages 20 through 29 were at highest risk for an unbelted serious injury at 34%.
- Alcohol and/or drug-impaired drivers are also often unbuckled (43%).

Priority Safety Strategies

To increase safety measures to reduce Unbelted Vehicle Occupant crashes, the following strategies should be implemented:

- Enact primary seat belt legislation that includes primary enforcement of seat belt use for all passengers, of all ages, in all seating positions (Policy).
- Enact stronger penalties for lack of seat belt use (Policy).
- Conduct outreach to tribal governments to enforce tribal primary seatbelt law and outreach to rural law enforcement to enforce North Dakota’s seatbelt law.
- Promote employer and insurance safety programs for non-compliance of belt use.
- Promote statewide education of child restraint best practices.

SPEEDING/AGGRESSIVE DRIVING

Speeding substantially increases the occurrence and seriousness of crashes. Higher speeds result in reducing a driver’s response time to avoid a crash, increases the need for greater stopping distance, increases crash impact, and increases the potential for loss of vehicle control. Aggressive drivers most often commit a combination of unsafe traffic offenses such as, exceeding safe speeds for road conditions, following too closely, failing to yield, swerving in and out of traffic, and disregarding traffic controls that endanger themselves, their occupants, and other roadway users. Other risk factors such as alcohol and/or drug use and lack of seat belt restraints are associated with higher percentages of speeding or aggressive driving serious crashes.

On North Dakota roadways, there were 1,071 serious crashes resulting in 1,298 serious injuries between 2012 and 2016 in which the crash involved a speeding or aggressive driver (NDDOT, 2017). This is an average of 260 serious injuries per year and accounted for 39% of all serious injuries during the 5-year study period.

Highlights from the most recent crash data (2012-2016) include (NDDOT, 2017):

- Most serious injuries involving Speeding/Aggressive Driving occurred on rural roads (80%) on state (44%) and local road (36%) systems.
- Most speed-related serious injuries are single-vehicle type (60%) and most often involved a vehicle rollover (61%).
- Intersection-related angle and rear-end crashes result in a high number of serious injuries (32%) and pose a serious threat to other motorists.
- Younger male drivers ages 20 through 29 were at highest risk for a speed-related crash (29%).
- Of the speed-related serious injuries, contributing factors included Unbelted Vehicle Occupants (53%) and alcohol or drug use (43%).
- Summer months, particularly afternoons and evenings, account for 31% of speed-related serious injuries.

Priority Safety Strategies

To increase safety measures to reduce Speeding/Aggressive Driving crashes, the following strategies should be implemented:

- Increase fines for right-of-way and speed violations and enhance penalties for habitual offenders (item requiring legislation to enact law [Policy]).
- Strengthen sustained, well-publicized speed enforcement resulting in greater speed detection and public perceived risk of being stopped and ticketed.
- Implement pilot automated enforcement projects (i.e., work or school zones), coupled with public outreach, and assess impact on aggressive driving and public acceptance (Policy).

Figure 5-5. Speeding/Aggressive Driver Fatality and Serious Injury History

Source: NDDOT, 2017
**YOUNG DRIVERS**

In the United States, the fatal crash rate per mile driven for young drivers 16 to 19 years of age is nearly 3 times the rate for drivers 20 years old and older (Insurance Institute for Highway Safety Highway Loss Data Institute, 2018). Motor vehicle crashes are a leading cause of teen death with the highest risk during the first 6 months of licensure. Young drivers are over-represented in serious crashes because of their lack of maturity leading to risky driving habits and their inexperience in recognizing and skillfully responding to hazards. Young drivers tend to overestimate their driving ability and underestimate the dangers on the road.

On North Dakota roadways, there were 480 serious crashes resulting in 601 serious injuries between 2012 and 2016 in which the crash involved a driver between the ages of 14 and 20. This is an average of 120 serious injuries per year and accounted for nearly 18% of all serious injuries during the 5-year study period.

Highlights from the most recent crash data (2012-2016) (NDDOT, 2017) include:

- Majority of serious injuries involving a young driver occurred on rural roads (68%) on state (32%) and local road (36%) systems.
- Half of young driver-related serious injuries are single-vehicle type (51%) and more often involved a vehicle rollover (55%) and an angle crash (27%).
- Young drivers ages 14, 15, 16, and 17 accounted for 38% of young driver serious injuries. Drivers 18, 19, and 20 were involved in the largest number of crashes at 62%.
- Young driver serious injuries more often occurred during the summer months (34%) on dry roads (78%) and during daylight conditions (60%).
- Unbelted occupants (48%), speeding (42%), and driver impairment (24%) were key contributors to the seriousness of young driver injuries.

**Priority Safety Strategies**

To increase safety measures to reduce Young Driver crashes, the following strategies should be implemented:

- Enforce seat belt use for all passengers in all seating positions.
- Enact primary seat belt legislation that includes primary enforcement of seat belt use for all passengers, of all ages, in all seating positions (Policy).
- Strengthen fines/penalties for speed violations (Policy).
- Strengthen enforcement of underage drinking and driving.
- Implement hands-free cell phone law to aid in the detection and enforcement of distracted driving (Policy).
- Restrict passengers for 6 months for all novice drivers under the age of 18 (Policy).
- Extend nighttime driving restriction to 6 months for all novice drivers under the age of 18 (Policy).
- Implement a policy requiring a minimum age of 15 (or 16) for learner’s permit (Policy).
- Implement a policy requiring a minimum age of 17 to qualify for a full, unrestricted license (Policy).
- Require parent education as a driver education classroom component (Policy).
- Require classroom education for licensure and incorporate educating novice drivers about driving risks (Policy).

**Figure 5-6. Young Driver Fatality and Serious Injury History**

Source: NDDOT, 2017
Other Areas of Emphasis
HEAVY VEHICLES

Heavy vehicle crashes involve at least one single unit truck, semitractor trailer, or a triple combination. Most fatalities resulting from heavy vehicle crashes are the occupants of passenger vehicles due to the difference in the weight of large trucks as well as greater ground clearance, which can result in a smaller vehicle under-riding the truck in a crash. National studies have shown that car drivers are principally at fault in about three-quarters of fatal car-truck crashes (ATA, 2013). Sharing the road can be done safely if motorists drive a safe distance from heavy trucks and account for the breaking, visibility, and maneuverability limitations of large trucks.

Heavy vehicles make up approximately 8% of North Dakota’s vehicle registrations. Crashes involving these heavy vehicles result in 120 serious injuries per year, approximately 18% of all serious injuries, and are increasing at a rate of around 9% per year.

Highlights from the most recent data (2012-2016) (NDDOT, 2017) include:

- 75% of serious injuries involving heavy vehicles occur on state system highways versus 48% of all serious injuries.
- From a behavior perspective, drivers involved in a heavy vehicle crash are less likely to be impaired (20% versus 33% overall) or speeding (37% versus 39%), more likely to have been distracted (10% versus 7%), and more likely to be belted (58% versus 51%).
- From an infrastructure perspective, heavy vehicle serious injuries are less likely to be categorized as a single-vehicle Lane Departure (25% versus 44% overall), and more likely to involve multiple vehicles at an intersection (33% versus 29%) or head-on with an opposing vehicle (23% versus 13%).
- 20% of heavy vehicle serious injuries occur during winter weather conditions compared to 16% overall.

Priority Safety Strategies

To increase safety measures to reduce Heavy Vehicle crashes, the following strategies should be implemented:

- Reduce fatigue related crashes by improving the efficiency of existing truck parking spaces and by installing center and edge-line rumble strips.
- Conduct traffic enforcement, coupled with public outreach, with a special focus on higher-risk traffic areas/times, such as the oil region, winter driving, and grain harvest season.
- Increase safety awareness of the motoring public, motor carriers, and heavy vehicle drivers through Share the Road Safely/No-Zone education and outreach activities.
- Improve safety through expanded truck maintenance programs, increased driver and vehicle inspections, and post-crash analysis.
- Improve roadway infrastructure for heavy vehicle operation by adding turn lanes at key intersections, developing/deploying rural safety corridors, and installing dynamic intersection warning systems at intersections determined to be at-risk.
- Improve heavy vehicle safety data by increasing the accuracy and completeness of crash reports.
- Improve commercial motor vehicle safety and size and weight compliance by using enhanced screening technologies.

Figure 5-7. Heavy Vehicle Fatality and Serious Injury History

Source: NDDOT, 2017
OLDER DRIVERS

Older drivers include drivers, pedestrians, bicyclists, and motorcyclists that are 65 years and older. Census data indicate that people 65 and older make up approximately 14.5% of North Dakota’s population compared to 14.1% nationally.

On North Dakota’s roadways, there were 381 serious injuries related to older road user crashes between 2012 and 2016. This is an average of 76 serious injuries per year and accounted for approximately 12% of all serious injuries during the 5-year study period.

Safety research suggests that the aging process affects driver performance in key ways including: reduced visual acuity, increased reaction times, and limitations in judging time and distance.

Literature (NDDOT, 2017) also suggests that Older Drivers tend to be physically frailer and, as a result, crashes more often result in serious injuries for Older Drivers.

Highlights from the most recent data (2012 - 2016) (NDDOT, 2017) for crashes involving older road users on North Dakota’s roadways include:

- Majority of the serious injuries from these crashes occurred on the state’s system (53%).
- The most common types of serious injuries involving older road users occur at intersections – 48% versus 29% of all serious injuries.
- Older road users are also over-represented in head-on and sideswipe opposite direction crashes (18% versus 13% of all serious injuries) and serious injuries involving bicycles (3% versus 2% of all serious injuries).
- Older road users are under-represented in serious injuries involving Unbelted Vehicle Occupants (37% versus 48% of all serious injuries), Speeding/

Aggressive Driving (25% versus 39% of all serious injuries) and Alcohol and/or Drug Related (8% versus 33% of all serious injuries).

Priority Safety Strategies

To increase safety measures to reduce Older Driver crashes, the following strategies should be implemented:

- Establish a broad-based coalition to address older adults’ transportation needs.
- Implement localized license-driver testing to enable older drivers to maintain independent mobility through obtaining a restricted driver’s license within their local geographical area.
- Develop informational resource(s) and conduct public outreach for older driver safety; addressing driving skill assessment and screening, educational opportunities, licensing options, and safe mobility alternatives including shared-ride technology applications.
- Establish statewide one-stop, online resource to inform and guide the public on safety screening for law enforcement, family, and physicians to report at-risk drivers; driving skill assessments, educational courses, licensing options, and safe mobility alternatives.

![Figure 5-8. Older Driver Fatality and Serious Injury History](source: NDDOT, 2017)
PEDESTRIANS/BICYCLISTS
Pedestrians and bicyclists are considered at-risk road users because of their significant weight disadvantage in encounters with motor vehicles. Pedestrians and bicyclists incurred 195 serious injuries (143 pedestrians and 52 bicyclists) between 2012 and 2016. This is an average of 39 serious injuries per year and accounted for approximately 6% of serious injuries during the 5-year study period.

Highlights from the most recent data (2012-2016) for pedestrian/bicycle crashes include:
- 56% of serious pedestrian/bike injuries occurred in urban areas.
- 74% of serious pedestrian/bike injuries occurred on local system roadways.
- Approximately 30% of serious pedestrian/bike injuries occurred at intersections (23% for pedestrians and 54% for bicycles).
- 21% of serious pedestrian/bike injuries involved a young driver between 14 to 20 years old compared to 18% of all serious injuries.
- 25% of serious pedestrian/bike injuries were considered alcohol/drug related.
- Teenagers (10-19) and younger adult drivers (20-29) were involved in more than 40% of serious pedestrian/bike injuries.
- Around two-thirds of those involved in serious pedestrian/bike injuries were males.

Priority Safety Strategies
To increase safety measures to reduce Pedestrian/Bicyclist crashes, the following strategies should be implemented:
- Curb Extensions (at urban intersections).
- Median Refuge Islands (at urban intersection and mid-block crossings).
- Road Diets (convert urban 4-lane arterials and collectors to 3-lane facilities).
- Rapid Rectangular Flashing Beacons.
- High-Intensity Activated crossWalk (HAWK) Pedestrian Activated Signals.
- Count Down Timers and Leading Pedestrian Intervals (at traffic signals).
- Adoption and Implementation of Bike Friendly Edge Rumble Strips (periodic gaps in the line of rumbles to allow bikes the opportunity to move from travel lanes to shoulders without traversing any grooves).

Figure 5-9. Pedestrian/Bicyclists Fatality and Serious Injury History

Source: NDDOT, 2017
LOCAL SYSTEM ROADWAYS

Local governments own and operate approximately 100,000 (93%) of the almost 107,000 miles of roads in North Dakota. Crashes along this local system resulted in 1,698 serious injuries between 2012 and 2016. This is an average of 340 per year and accounted for 52% of all serious injury crashes during the 5-year study period (NDDOT, 2017).

Highlights from the most recent data include (NDDOT, 2017):
- 63% of serious injuries on local roads occurred in rural areas.
  - 79% of rural serious injuries were segment related, of which 85% involved single-vehicle run-off-the-road crashes, of which 27% occurred in horizontal curves. Only 1% of serious rural injuries involved hitting wildlife (deer).
  - 21% of rural serious injuries were intersection related. Most occurred at locations with STOP sign control, of which 49% involved a right-angle collision.
- 37% of serious injuries on local roads occurred in urban areas.
- 51% of urban serious injuries were intersection related. 24% occurred at locations with traffic signal control, of which 53% involved a right-angle collision.

Priority Safety Strategies

To increase safety measures to reduce Local System Roadway crashes, the following strategies should be implemented:
- Continue to inform local governments of the North Dakota Local Road Safety Plans (LRSP) and educate them on the process to access HSIP funds to advance the LRSP.

Rural Roads
- Install enhanced edge lines (6 inches and embedded wet-reflective).
- Install intersection street lighting.
- Install chevrons (enhanced curve warning).

Urban Roads
- Install pedestrian enhancements — curb extensions, median refuge islands, countdown timers, and leading pedestrian interval at traffic signals.
- Install confirmation lights at traffic signals (to supplement enhanced enforcement of red-light running).

![Figure 5-10. Local System Fatality and Serious Injury History](Source: NDDOT, 2017)
OIL-IMPACT COUNTIES

Seventeen counties comprise the northwest quarter of North Dakota and have experienced significant traffic volume and economic development growth because of the crude oil extraction from the Bakken Formation. In fact, traffic volumes more than doubled between 2008 and 2014 and the statewide fraction of serious injuries increased from around 30% to more than 50% (an annual increase approaching 15% per year). Since 2014, the volume of traffic and the number of serious crashes have decreased but remain well above 2008 values.

Highlights from the most recent data (2012-2016) (NDDOT, 2017) regarding crashes in the Oil-Impact Counties include:

- There were 1,651 serious injuries, an average of 329 per year.
  - These serious injuries represent around 50% of all serious injuries statewide.
- Approximately 67% of all heavy truck-related crashes in North Dakota occurred in the Oil-Impact Counties.
- Crashes categorized as speed related, heavy truck related, Lane Departure, multi-vehicle opposing, and winter weather are above statewide averages.

Priority Safety Strategies

To increase safety measures to reduce crashes in Oil-Impact Counties, the following strategies should be implemented:

- Install left- and right-turn lanes.
- Install street lights at key intersections.
- Install safety corridors.
- Install RICWS.

Figure 5-11. Oil-Impact Counties Fatality and Serious Injury History

Source: NDDOT, 2017

Image source: https://www.ndstudies.gov/energy; Photo courtesy of Whiting Oil.
SECTION 6
Statewide Policy Directions
Effective traffic safety policy plays a critical role in successfully implementing North Dakota’s comprehensive strategy to reach Vision Zero. Evidence-based or proven traffic safety laws, backed by consistent, highly visible enforcement and public outreach, is proven to be a strong catalyst for changing high-risk driver behavior, cultural norms, and public perceptions about road safety (World Health Organization, 2013).

Equally important is the public’s awareness of and support for traffic laws and regulations intended to keep them and loved ones safe. During the Vision Zero safety workshops, North Dakota safety stakeholders and partners from across the state representing multi-disciplinary and multi-jurisdictional perspectives, discussed and identified the following priority legislative/policy-related safety strategies as essential to advancing the Vision Zero Plan:

Belt Use
- Enact primary seat belt law.
- Stronger penalties for lack of seat belt use.

Alcohol and/or Drug Related
- Implement an ignition interlock program.
- Strengthen enhanced penalties for high BAC offenders.
- Mandate alcohol server training as a condition of alcohol licensure.

Speed
- Increase fines for speed violations.
- Enhance penalties for habitual speed offenders.
- Implement pilot automated enforcement projects.

Young Drivers
- Hands-free cell phone law to aid in the detection and enforcement of distracted driving.

North Dakota then-Governor Jack Dalrymple signs Impaired Driving Bill (2013)

- Strengthen Graduated Driver Licensing, including:
  - Passenger restriction lasting 6 months for all novice drivers under the age of 18.
  - Extend nighttime driving restriction lasting 6 months for all novice drivers under the age of 18.
  - Minimum age of 15 (or 16) for learner’s permit.
  - Minimum age of 17 to qualify for a full, unrestricted license.
  - Require parent education as a driver education classroom component.
  - Require classroom education for licensure.

The NHTSA’s study, A Comparative Analysis of State Traffic Safety Countermeasures and Implications for Progress “Toward Zero Deaths” in the United States (NHTSA, 2017b), concluded that states that implemented a greater number of the selected, proven behavioral countermeasures or safety strategies had lower fatality rates. More simply, states implementing a greater number of proven strategies, save more lives. North Dakota’s Vision Zero Plan incorporates 9 of the 11 NHTSA-selected priority countermeasures; of the 9 strategies included in the Vision Zero Plan, 6 are policy-related.
SECTION 7
Implementation and Evaluation
Implementation and Evaluation

Implementation

Implementation is the foundation for this Vision Zero Plan and is the basis of support for the short-term goal of fewer than 75 fatalities by year 2025. Implementation is also integral to the long-term vision of zero crash-related deaths by deployment of evidenced-based strategies for at-risk, serious crash locations and to strengthen statewide policies. To gain a better perspective about implementation, the previous SHSP and annual HSIP (infrastructure projects) and Highway Safety Program (driver-behavior initiatives) reports were reviewed.

The 2013 SHSP (CH2M HILL, 2013) documented infrastructure and driver-behavior priorities, including:

- **Infrastructure**: Lane departure crashes along rural roadways, rural and urban intersection crashes with a focus on right-angle collisions and an expanded level of safety investment along the state’s local system of roadways where one-half of serious crashes occur.
- **Driver Behavior**: Improved safety partnerships, enhanced technical assistance and training, additional data-driven components to increase the effectiveness of high visibility enforcement campaigns and continued strengthening of the state’s traffic safety policy.

Highlights of what North Dakota has accomplished relative to implementation over the past 5 years and the adopted priorities for implementation looking ahead to the next 5 years are included in this section.

Accomplishments – Looking Back

Since the 2013 North Dakota SHSP (CH2M HILL, 2013), North Dakota has successfully reduced fatalities and serious injuries through enhanced existing transportation-safety programs and policy and the implementation of new safety programs.

Examples of North Dakota’s infrastructure and behavioral-related efforts to improve safety on all public roads follow.

Infrastructure

Highlights of infrastructure-related safety accomplishments include completing the Local Road Safety Program and implementing low-cost safety strategies along road segments, curves, and intersections as well as a select few higher-cost strategies.

**Local Road Safety Program.** The 2013 SHSP documented that more than one-half of serious crashes in North Dakota occur on the local road system and, historically, there has been little safety project development engagement with local agencies and even less safety investment along the local system. To address these issues, the SHSP committed NDDOT to increasing the level of engagement with local agencies in statewide safety planning and committed to dedicating one-half of the Highway Safety Improvement Funds to local system projects. To that end, NDDOT partnered with the 53 counties (including the 12 largest cities, four Native American reservations, and one national park) to prepare safety studies of their road systems. Safety plans (that included a systemic risk evaluation, system prioritization, and project development) were completed for these local agencies in 2016. Following completion of the individual plans, agencies began submitting projects for HSIP funding using application forms that were prepared and included in each plan. These projects are now being implemented and there is a 50-50 distribution of HSIP funds between the state and local system.

Low cost segment-based safety strategies. Majority of serious injury crashes in North Dakota are in rural areas and the most common type of serious crash is single-vehicle
lane departure. To address these crashes, NDDOT has placed a high-priority on widely deploying low-cost, proven effective safety strategies, including:

- Center, shoulder, and edge rumble strips — center and edge rumble strips have been deployed along the entire rural state system (approximately 6,000 miles) and as part of 11 county and 2 tribal safety projects (that were identified as part of the Local Road Safety Program).

- Enhanced edge lines — 8 counties have implemented projects to install enhanced edge line (6-inch wide edge lines as opposed to the traditional 4-inch lines) along their rural roadways.

- Enhanced horizontal curve delineation — analysis of North Dakota crash data indicates that serious injuries associated with single-vehicle lane departure crashes are over-represented in horizontal curves, as a result, enhanced curve delineation (chevron warning signs, delineators, pavement markings, and shoulder paving/widening) is being implemented at high-priority locations on the state’s system as part of 8 districtwide safety projects and on the local system as part of 6 county and 2 tribal safety projects.

- Shoulder drop-offs and clear zones — projects that involve eliminating the drop-off from pavement surface to gravel shoulders and establishing clear zones (obstacle free recovery areas adjacent to the traveled portion of the roadway) are being implemented as part of several county- and tribal-safety projects.

**Low cost intersection-based safety strategies.** Intersection crashes at both rural and urban intersections have also been a priority for safety investment, including:

- Street lights at rural intersections — NDDOT is in the process of installing destination lighting at 308 rural intersections along state and county systems as part of eight districtwide safety projects. Further installation of street lights at intersections along the local system is being done as part of two county and one tribal safety project.

- Enhanced intersection traffic control devices — providing larger regulatory and warning signs and adding pavement messages and STOP bars is underway at 778 rural intersections along the state’s system and this type of work is also being done along the local system as part of 16 county and 3 tribal safety projects.

- Dynamic warning systems — systems that use technology to provide an advanced warning of approaching vehicles at rural intersections have demonstrated an ability to reduce right-angle collisions that cause majority of serious injuries at rural intersections. Rural intersection collision warning systems have been installed at three locations along the state’s system.

- Confirmation lights — in urban areas the most common type of crash resulting in serious injuries is a right-angle collision at intersections with traffic signal control, an indication of a problem associated with red-light running. To address this urban problem, three cities have undertaken projects to install confirmation lights, which are small lights added to traffic signal mast arms that help law enforcement be more effective in their efforts to both monitor and tag red-light violators.

- Pedestrian enhancements — the number of serious injuries involving pedestrians in North Dakota is increasing and many of these crashes occur at signal-controlled intersections in urban areas. To address this growing problem, four cities have implemented projects to add count-down pedestrian timers and one city is in the process of adding leading pedestrian intervals to their traffic signal systems. Some cities are implementing advance walk technology.

In addition to these low-cost strategies, NDDOT has also placed a priority on replacing STOP and signal control at 10 identified high volume/crash prone intersections along the state’s system with roundabouts. Roundabouts are a high-cost strategy (around $1 to $2 million per intersection), but have been proven effective at virtually eliminating right-angle collisions, which are the cause of majority of serious injuries at these types of intersections.

**Behavioral**

Highlights of behavioral-related accomplishments include expanded partnerships, safety partner technical assistance and training, expanded high-visibility enforcement, strengthening of traffic safety policies, and behavioral program evaluation.

**Expanded, diverse safety partnerships.** Since the 2013 SHSP (CH2M HILL, 2013), North Dakota has intentionally and strategically extended the interdisciplinary reach of its safety partners and stakeholders. SHSP implementation efforts require the leadership and engagement of the 4Es of safety. However, successful SHSP implementation extends beyond the traditional 4Es to also include engagement and support of state, local, and tribal partners representing the judicial system, public and private sectors, government agencies, elected officials, employers, community groups, nonprofits and advocacy groups, and the media. In addition, collaborative public-private partnerships can extend beyond the base government resources to improve safety. Since the 2013 SHSP (CH2M HILL, 2013), safety partners
have leveraged financial, staffing, knowledge/expertise, and informational resources to work toward common goals. North Dakota has greatly strengthened and diversified its statewide safety network to include non-traditional safety stakeholders through the following example programming initiatives:

- County outreach program.
- SHSP strategy implementation teams.
- LRSP.

**Technical assistance and training for behavioral safety partners.** North Dakota has bolstered its technical assistance and training so safety partners are equipped to effectively carryout their respective safety roles and serve as champions of the state SHSP initiatives. The NDDOT Safety Division and partners have offered technical assistance and training through statewide conferences/workshops and have provided easy access to a wide range of supporting information and materials through web-based resources and targeted email communication. Training includes, but is not limited to:

- DUI training for enforcement and court personnel.
- Child Passenger Safety workshops, presentations, and car seat clinics.

**Data-driven, high visibility enforcement programs.** Cooperative high visibility enforcement (HVE) campaigns bring together state, county, city, university, and tribal law enforcement agencies to offer multiagency, highly visible, saturated enforcement. North Dakota’s HVE offer a consistent media messaging that empowers the driving public to make the right choice to drive safely; buckled up, focused, sober, and to drive at safe speeds. Data-driven enforcement and the supporting public outreach campaigns are planned during months, time of day, and at locations and community events that, based on analysis of crash data, are of higher risk for serious crashes. North Dakota has experienced successful declines in motor vehicle crash fatalities since 2012, and the evidence-based, proven approach of HVE campaigns are a cornerstone to continuing this positive safety trend. North Dakota’s statewide HVE saturations include:

- Click It or Ticket It seat belt campaigns.
- Drive Sober or Get Pulled Over campaigns.

**Continued strengthening of North Dakota traffic safety policy.** Public education coupled with strong driving laws supported by enforcement action is the most effective approach to improve driver behavior. Since the 2013 SHSP (CH2M HILL, 2013), North Dakota has made strong advancements in improving traffic safety policy, including:

- Strengthened DUI law through: (1) enhanced sanctions for high BAC DUI offenders; (2) increased jail time for repeat offenders; (3) criminalizing BAC test refusal; (4) mandatory and extended enrollment of repeat offenders in the 24/7 Sobriety Program.
- Strengthened Child Passenger Safety law requiring children to be restrained through age 7.
- Enhanced distracted driving law that strengthens the fine if a driver violating a traffic law is found to impair the safe operation of his/her vehicle.

**Supporting strong safety program evaluation.** The NDDOT Safety Division and partners have strongly invested in program evaluation to assess behavioral program effectiveness, to monitor progress, and to inform programming decisions. The North Dakota State University Upper Great Plains Transportation Institute is a key provider of evaluation services as well as special NHTSA assessment teams to support North Dakota’s behavioral program improvement efforts. NHTSA’s guide on behavioral program evaluation, *The Art of Appropriate Evaluation for Highway Safety Program Managers* (1999), outlines five basic methods to measure safety program effects including observational surveys; knowledge, attitude, and awareness surveys; activity records; data records; and media coverage. The NDDOT Safety Division Annual Report, Fiscal Year 2017 (NDDOT, 2018b) reports on all five measures. The following sampling of evaluation studies provides the needed feedback and data to help inform the NDDOT Safety Division’s programming decisions:

- Annual Knowledge, Attitudes, Behaviors, and Beliefs (KABB) survey.
- Annual crash and driver data analysis and performance monitoring.
- 24/7 Sobriety Program evaluation.
- Analysis of DUI arrest and conviction data.
- Annual observational seat belt use survey.
- NHTSA Impaired Driving Assessment.
- NHTSA Occupant Protection Assessment.
IMPLEMENTATION – LOOKING AHEAD

Results of the data-driven prioritization process indicate that from an infrastructure perspective, the primary emphasis be placed on implementing evidence-based strategies intended to mitigate Lane Departure crashes in rural areas and Intersection crashes in rural and urban areas on the state and local system of roadways. The data suggest a secondary emphasis on crashes involving Heavy Vehicles (especially in the Oil-Impact Counties) and Pedestrians/Bicyclists. From a driver-behavior perspective, the primary emphasis is on addressing Unbelted Vehicle Occupants, Speeding/Aggressive Driving, Alcohol and/or Drug Related driving, and Young Drivers with a secondary emphasis on Older Drivers.

North Dakota’s Emphasis Area Teams will be instructed to focus their efforts on implementing the following types of evidence-based strategies at high-priority locations identified through crash analysis and systemic risk-based evaluations and determining annual quantities to be deployed (miles of segments to be treated, numbers of intersections, number of training activities, and numbers of high enforcement campaigns) based on budget constraints, partnerships, and overall feasibility. The strategies for the teams to focus on include:

- **Lane Departure.**
  - Safety corridors along two-lane rural highways; features that would be added in the safety corridors include: longitudinal delineators, enhanced edge lines, enhanced curve warning signs, shoulder paving, destination street lights, and turn lanes at key intersections.
  - Longitudinal delineators.
  - Embedded wet-reflective pavement markings.
  - 6-inch edge lines.
  - Edge and center rumble strips.
  - Shoulder paving.
  - Center buffers (to address head-on crashes).
  - Median barrier (along freeways).

- **Intersections.**
  - Roundabouts (instead of traffic signals).
  - Reduced conflict intersections.
  - Street lighting.
  - Install dynamic intersection warning systems at rural intersections (RICWS).

- **Confirmation lights (on urban traffic signals to support red-light enforcement).**
- **Access management (near intersections).**

- **Alcohol and/or Drug Related Driving.**
  - Implement an ignition inter-lock program.
  - Strengthen enhanced penalties for high BAC offenders.
  - Maintain high visibility sobriety check points.
  - Conduct a comprehensive assessment of administrative licensing sanctions for driving while impaired by alcohol and/or drug related use.
  - Limit the scope of administrative hearings.
  - Identify/implement approaches to more effectively educate judges.
  - Expand ARIDE training.
  - Strengthen prosecutor and law enforcement training.
  - Support mandating alcohol server training as a condition of alcohol licensure.
  - Strengthen highly publicized compliance checks and alcohol server training retailers and merchants.

- **Unbelted Vehicle Occupants.**
  - Support enacting primary seat belt legislation for all ages.
  - Support enacting higher penalties for lack of seat belt use.
  - Conduct outreach to both tribal and local governments related to improving seat belt usage and enforcement.
  - Promote employer and insurance safety programs for non-compliance of belt use.
  - Promote statewide education of child restraint best practices.

- **Speeding/Aggressive Driving.**
  - Support increased fines for right-of-way and speed violations and enhance penalties for habitual offenders.
  - Strengthen speed enforcement campaigns.
  - Implement pilot automated enforcement projects (school or work zones) coupled with public outreach.

- **Young Drivers.**
  - Enforce seat belt use for all passengers.
  - Enact primary seat belt legislation that includes primary enforcement of seat belt use for all passengers, of all ages, in all seating positions.
- Strengthen penalties for speed violations.
- Strengthen enforcement of underage drinking and driving.
- Implement hands-free cell phone law.
- Restrict passengers for 6 months for all novice drivers under 18 years of age.
- Extend nighttime driving restriction to 6 months for all novice drivers under 18 years of age.
- Implement a policy requiring a minimum age of 15 for a learner’s permit.
- Implement a policy requiring a minimum age of 17 to qualify for a full, unrestricted license.
- Require classroom education for licensure.
- Require parent participation as part of the driver education classroom component.

- **Heavy Vehicles.**
- Reduce fatigue-related crashes by improving the efficiency of existing truck parking spaces and by installing center and edge-line rumble strips.
- Conduct traffic enforcement, coupled with public outreach, with a special focus on higher-risk traffic areas/times, such as the oil region, winter driving, and grain harvest season.
- Increase the safety awareness of the motoring public, motor carriers, and heavy vehicle drivers through Share the Road Safely/No-Zone education and outreach activities.
- Improve safety through expanded truck maintenance programs, increased driver and vehicle inspections, and post-crash analysis.
- Improve roadway infrastructure for heavy vehicle operation by adding turn lanes at key intersections, developing/deploying rural safety corridors, and installing dynamic intersection warning systems at intersections determined to be at-risk.
- Improve heavy vehicle safety data by increasing the accuracy and completeness of crash reports.
- Improve commercial motor vehicle safety and size and weight compliance through enhanced screening technologies.

- **Older Drivers.**
- Establish a coalition to address older driver’s transportation needs.
- Implement localized license-driver testing to enable older drivers to maintain independent mobility through obtaining a restricted license within their geographic area.
- Develop informational resources and conduct public outreach for older driver safety; addressing driving skill assessment and screening, educational opportunities, licensing options, and safe mobility alternatives including shared-ride technology applications.
- Establish statewide one-stop online resource to inform and guide the public on safety screening, driving skill assessments, licensing options, and safe mobility alternatives.

- **Pedestrians/Bicyclists.**
- Curb extensions and median refuge islands at urban intersections and mid-block crossing locations.
- Road diets (convert urban four-lane arterials and collectors to three-lane facilities).
- Dynamic warning devices – Rapid Rectangular Flashing Beacons and HAWK activated signals.
- Count-down times and leading pedestrian intervals at urban traffic signals.
- Adopt and implement bike friendly edge rumble strips (periodic gaps in the line of rumbles to allow bicycles the opportunity to move from travel lanes to shoulders without traversing any grooves).

- **Local System Roadways**
- Continue to inform local governments of the North Dakota LRSP and educate them on the process to access HSIP funds to advance the LRSP.
- **Rural Roads**
  - Install enhanced edge lines (6 inches and embedded wet-reflective).
  - Install intersection street lighting.
  - Install chevrons (enhanced curve warning).
- **Urban Roads**
  - Install pedestrian enhancements – curb extensions, median refuge islands, countdown timers, and leading pedestrian interval at traffic signals.
  - Install confirmation lights at traffic signals (to supplement enhanced enforcement of red-light running).

- **Oil-Impact Counties**
- Install left- and right-turn lanes.
- Install street lights at key intersections.
- Install safety corridors.
- Install rural intersection collision warning systems (RICWS).
Moving Vision Zero Forward – Key Examples

As illustrated by the following examples, NDDOT will partner with U.S. Department of Transportation, Federal Aviation Administration, and local communities to achieve Vision Zero.

Unmanned Aircraft System Integration Pilot Program.
The implementation of new, cutting-edge technology is a critical component of North Dakota’s Vision Zero strategy. The U.S. Department of Transportation and Federal Aviation Administration awarded the Unmanned Aircraft System Integration Pilot Program to NDDOT in May 2018. As the lead applicant for this program in North Dakota, NDDOT will work with partners and stakeholders to achieve several strategic objectives. A primary objective is integrating UAS or drone use for the safety of the traveling public to achieve Vision Zero.

Vision Zero Communities.
Over half or 52 percent of North Dakota’s fatal and severe injuries occur on its local roads. To accelerate North Dakota’s traffic safety efforts, it is imperative that local communities become more engaged in the state’s life-saving traffic safety efforts. On August 1, 2018, the NDDOT launched the Vision Zero Community Program.

A Vision Zero Community agrees to work toward zero motor vehicle crash fatalities and serious injuries in the community through implementing evidence-based strategies proven to reduce motor vehicle crashes including: widespread public education/outreach; implementing policies that support driver and passenger safety; high visibility enforcement of existing laws; technology advancements; and infrastructure/road safety improvements. The designation allows communities to receive technical assistance and support through the lead Vision Zero agencies and other Vision Zero partners to achieve the zero goal.

In turn, the Vision Zero Update process reviewed and considered the results and outcomes of other state, local, and tribal highway safety plans to inform Vision Zero planning and priority strategy selection. For example, the outcomes of the North Dakota LRSPs were considered in establishing Vision Zero strategies for high-risk rural segments and intersections to further reduce North Dakota’s fatalities and serious injuries.

The intentional alignment of transportation safety plans leverages limited resources and advances the implementation of the overarching Vision Zero Plan through safety project prioritization and delivery to move North Dakota toward its vision of zero deaths.

Evaluation

The key to effectively manage safety programs is knowing whether adopted initiatives have been effective and should therefore be continued or whether the initiatives did not achieve desired outcomes and should be modified or discontinued. Evaluation is used to help inform safety program managers about effectiveness.

North Dakota will continue evaluating outcomes on an annual basis. NDDOT will complete a review of crash data, including disaggregation of crashes into emphasis areas and development of trend lines to determine if implementation is driving North Dakota toward the 2025 goal of fewer than 75 motor vehicle crash-related fatalities. In addition, North Dakota will add an output-based component to the annual review process.

Outcomes measured in crash reduction only become apparent several years after implementation. It takes time to develop and deploy safety projects and then wait for several years of crash data to accumulate. Still, it may be difficult to determine with a high degree of certainty the effect of investment due to small sample sizes and short time frames. To help safety program managers deal with this challenge and to provide interim checks on progress, Emphasis Area Teams will add an annual review of outputs. The review will assess (1) if the investment funds the deployment of priority strategies and the amount of funding established by the Emphasis Area teams at the beginning of each year and (2) if the distribution of safety funding between emphasis areas and state and local systems is consistent with the adopted objectives.
The intentional alignment of transportation safety plans leverages limited resources and advances the implementation of the overarching Vision Zero Plan through safety project prioritization and delivery to move North Dakota toward its vision of zero deaths.

The results of these outcome and output-based evaluations will guide Emphasis Area Teams and safety program managers relative to establishing investment targets for the following year.

North Dakota is also committed to the ongoing evaluation of behavioral program effectiveness though the continued use of the Annual KABB survey, annual observations of seat belt usage, and participation in NHTSA’s program assessments.

**Vision Zero Plan Coordination with Other Plans**

The Vision Zero Plan serves as North Dakota’s overarching transportation safety plan providing strategic direction for the state’s HSIP, HSP, and the Commercial Vehicle Safety Plan (CVSP). The plan’s strategic goal, safety priorities, and strategies will be coordinated for alignment during the revisions and updates of these state safety plans as well as the development of the state’s long-range statewide strategic transportation plan, TransAction III; active and public transportation plan ND Moves; North Dakota’s Statewide Transportation Improvement Program; and the MPO Transportation Improvement Program. The Vision Zero safety priorities and strategies are aligned and the Planning & Asset Management Division, Local Government Division, Programming Division (responsible for the HSIP), Safety Division (responsible for the HSP), and the North Dakota Highway Patrol (responsible for the CVSP) helped to inform the Vision Zero planning discussions and resulting safety strategies.
SECTION 8
Conclusion
CONCLUSION

This Vision Zero Plan is the product of a 9-month effort by the Executive Leadership Team, the Steering Committee, Emphasis Area Teams, and the state’s safety partners. This plan is data driven and includes input from more than 200 representatives of local governments and private organizations representing the 4 Es of safety.

The Executive Leadership Team recognizes that this updated plan is a necessary part of achieving the short-range goal (fewer than 75 fatalities by the year 2025) and the vision of zero fatalities. However, the current fatality trend of a decrease of 1% per year will not achieve either the short-range goal or the long-term vision of zero fatalities in the near future. Reaching these objectives requires implementation that targets the adopted Priority Safety Emphasis Areas and invests in evidence-based strategies that are deployed at high-priority locations. The Executive Leadership Team also recognizes that current state polices will have to be enhanced to address seat belt usage, Alcohol and/or Drug Related Driving, and Speeding/Aggressive Driving.

Since the preparation of North Dakota’s last safety Plan in 2013, much has been accomplished:

- Safety projects along local road systems have been added to the state’s HSIP.
- Proven effective, low-cost strategies have been deployed along rural segment including curves and intersections on state, county, and tribal roadways.
- DUI related training has been provided for law enforcement and county personnel. Child Passenger Safety workshops have been conducted.
- DUI, Child Passenger Safety, and Distracted Driving laws were strengthened.

Over this timeframe, statewide fatalities dropped by more than 20%. However, the Executive Leadership Team also recognizes that relying on what was done in the past will not result in reaching the adopted goals. Achieving the goal will require the implementation of more effective and proven strategies, renewed efforts using new analytical methods to identify high-priority candidate locations for safety investment, and new statewide policies to address our Priority Safety Emphasis Areas. Examples of proven safety strategies and policies for implementation include:

- Deploy rural safety corridors.
- Add delineators along rural, two-lane highways to improve driver navigation.
- Continue to address rural intersections by adding street lights, dynamic warning systems, and roundabouts.
- Address safety at rural intersections by incorporating the design concept of reduced conflict intersections.
- Add barriers in freeway medians to prevent rare but often deadly head-on crashes.
- Improve seat belt usage by supporting enactment of primary seat belt legislation.
- Reduce alcohol and/or drug related driving by supporting the addition of ignition interlocks to the available menu of strategies.
- Increase the deterrence effect of law enforcement by supporting the increase in fines for right-of-way and speeding violations.

It is understood that the update of this plan is an on-going process and the next step is working closely with traffic safety partners to implement and enhance the state’s policies and practices that are the key to achieving the desired outcomes of fewer than 75 motor vehicle crash fatalities by 2025 and ultimately getting to zero.
REFERENCES AND ACRONYMS


Acronyms
### Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>4 Es of Safety</td>
<td>education, enforcement, engineering, and emergency medical services</td>
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<td>ARIDE</td>
<td>Advanced Roadside Impaired Driving Enforcement</td>
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<td>BAC</td>
<td>blood alcohol content</td>
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<td>CVSP</td>
<td>Commercial Vehicle Safety Plan</td>
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<td>DRE</td>
<td>Drug Recognition Expert</td>
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<td>driving under the influence</td>
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<td>FHWA</td>
<td>Federal Highway Administration</td>
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<td>HAWK</td>
<td>High-Intensity Activated crossWalk</td>
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<tr>
<td>HRRR</td>
<td>High Risk Rural Roads</td>
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<td>HMVMT</td>
<td>100 million vehicle miles traveled</td>
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<td>Highway Safety Improvement Program</td>
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<td>HVE</td>
<td>high visibility enforcement</td>
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<td>KABB</td>
<td>Knowledge, Attitudes, Behaviors, and Beliefs</td>
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<td>Local Road Safety Plan</td>
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<td>Metropolitan Planning Organization</td>
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<td>National Cooperative Highway Research Program</td>
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<td>National Highway Traffic Safety Administration</td>
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<td>Policy</td>
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<td>RICWS</td>
<td>rural intersection collision warning system</td>
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<tr>
<td>SHSP</td>
<td>Strategic Highway Safety Plan</td>
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<tr>
<td>TZD</td>
<td>Towards Zero Deaths</td>
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APPENDIX A

Regional *Vision Zero* Workshop Invitation
The North Dakota Department of Transportation (NDDOT) and partners seek your input to update the North Dakota Vision Zero plan (also known as the North Dakota Strategic Highway Safety Plan [SHSP]), through your participation in one of six upcoming regional Vision Zero workshops.

Vision Zero is a multi-agency initiative led by the NDDOT, the North Dakota Department of Health and the North Dakota Highway Patrol. Vision Zero is a statewide, interdisciplinary and coordinated approach to road safety involving 4E partners in education, enforcement, engineering and emergency medical services and other public and private sector partners. All partners work together to reduce motor vehicle crash fatalities and serious injuries to zero.

Vision Zero applies proven strategies including: (1) widespread public education/outreach, (2) working with the legislature to ensure state laws represent best practices in traffic safety, (3) high visibility enforcement of existing laws, (4) technology advancements, and (5) infrastructure/road safety improvements. Updating North Dakota’s Vision Zero plan is a critical step to move toward North Dakota’s zero goal.

Each day will begin with registration from 8:00-8:30 am, followed by the Vision Zero workshop from 8:30 am-3:30 pm. There will be a break for lunch on your own from 12:00 pm-1:00 pm.

The workshops will provide an overview of the planning process, examine crash data trends in North Dakota, highlight featured safety accomplishments, and most importantly, offer facilitated safety stakeholder dialogue and prioritization of safety strategies for the Vision Zero plan.

Included in the online registration is a survey for safety stakeholders to offer key regional traffic safety accomplishments and a suggested spokesperson for potential inclusion in a regional workshop. Please consider what accomplishment(s) may be helpful to feature during one of the safety workshops.

We value your partnership and we hope you will join us to offer your input into this critically important plan to save lives on North Dakota roads.

If you have questions, you may contact me at 701-328-4434 or kamongeon@nd.gov.

Respectfully,

Karin Mongeon

Safety Division Director
North Dakota Department of Transportation
APPENDIX B

Regional Vision Zero Workshop Materials
Vision Zero Workshop – Dickinson, ND
North Dakota Strategic Highway Safety Plan Update
April 17, 2018

WORKSHOP AGENDA

8:00 AM    Registration, Coffee and Networking
8:30 AM    Welcome and Introductions

An Overview of North Dakota’s Strategic Highway Safety Plan and Processes

Stakeholder Discussion: What is important to incorporate in the updated Vision Zero Plan?

9:45 – 10:00 AM   Break (15 min.)

Overview of Severe Crash Data and Identification of Priority Emphasis Areas

Stakeholder Discussion: North Dakota Safety Strategies: Infrastructure

11:45 – 1:00 PM    Lunch (On Your Own)

Stakeholder Discussion: North Dakota Safety Strategies Behavioral

1:40 – 3:05 PM    Stakeholder Strategy Prioritization and Break

Prioritization Debrief
Workshop Wrap Up: Next Steps and Staying Connected

3:30 PM    Adjourn
Karin Mongeon, Safety Division Director (NDDOT)

kamongeon@nd.gov

Karin Mongeon has been the Safety Division Director for the NDDOT since 2014. Prior to this, Karin was the manager of the NDDOT’s Traffic Safety Office for eight years. Karin graduated from the University of Mary in Bismarck with a bachelor’s degree in nursing. She worked as an oncology nurse before transitioning to state government where she’s been responsible for the administration of various public health and human services programs for nearly 20 years.

Paul Benning, Local Government Division Director (NDDOT)
pbenning@nd.gov

Paul earned his Bachelor of Science degree in Civil Engineering from the North Dakota State University in 1987. He began working fulltime with the NDDOT right after college. During his career, Paul has served the NDDOT in a number of capacities, including his current position as the Director of Local Government. He has been active in helping Local Public Agencies, such as Counties and Cities for nearly 20 years. Paul is a Professional Engineer with a background in statewide county, city, and transit administrative activities.

Jane Berger, Programming Division Director (NDDOT)
jaberger@nd.gov

Jane Berger is the Programming Division Director for the North Dakota Department of Transportation. She is a registered Professional Engineer and has 19 years of experience at the North Dakota DOT with a background in Traffic Operations, Pavement Management and Project Programming. Jane is a steering committee member for the state Strategic Highway Safety Plan and was a member of the DOT team partnering with local agencies throughout the state to develop Local Road Safety Plans.

Bryon Fuchs, Assistant Local Government Engineer
blfuchs@nd.gov

Bryon is the Assistant Local Government Engineer for the North Dakota Department of Transportation. He graduated from NDSU and is a Registered Professional Engineer in the State of North Dakota. He is responsible for various funding programs that assist Local Public Agencies (LPA’S) with improving their Transportation Infrastructure (Roads and Bridges), pedestrian and bicycle facilities, access to recreational areas, and Safety Improvement Projects. He is married and has one son.

Shawn Kuntz, Traffic Operations Engineering Team Lead
skuntz@nd.gov

Shawn is the Traffic Operations Engineering Team Leader for the NDDOT and a licensed Professional Engineer in North Dakota. Shawn represents North Dakota as a member of the AASHTO Subcommittee on Traffic Engineering. He manages the development and implementation of the Highway Safety Improvement Program in coordination with the Local Road Safety Program and the Strategic Highway Safety Plan.
Vision Zero Workshops
Team Bios

Scott Zainhofsky, Planning/Asset Management Director
szainhofsky@nd.gov

Scott Zainhofsky is the Planning/Asset Management Division Engineer for the NDDOT. He has been in this position since 2007 and has held several positions both in the central office and a district office of the Department. Currently, Scott has the pleasure of leading a great team whose responsibilities include: long-range and modal planning, service- and asset-related investment analysis, pavement management, infrastructure-data management, rail programs, mapping, and traffic data. He has been a registered Professional Engineer in the state of North Dakota since June 2002 and holds Bachelors and Masters degrees in Civil Engineering from the University of North Dakota.

Howard Preston, Principal Transportation Engineer (CH2M now Jacobs)
howard.preston@ch2m.com

Howard Preston is a Principal Transportation Engineer at Jacobs, with more than 30 years of experience in safety improvement projects and safety studies and research. He worked in both public and private sector. He started his career with MnDOT developing MnDOT’s highway safety improvement program. After his experience at MnDOT, he worked for private engineering companies where has managed teams of transportation engineers, designers, and planners working on a wide variety of projects. During Howard’s career, he has led multiple statewide safety projects and assisted in the development of over 150 safety plans. Howard graduated from Iowa State University with a degree in Civil Engineering and is a registered Professional Engineer.

Cheri Marti, Driver Behavior Team Lead and Outreach Facilitator (CH2M now Jacobs)
Cheri.f.marti@gmail.com

Cheri Marti joined CH2M, now Jacobs, as the driver behavior specialist in 2011. Her work with Jacobs supports the driver behavior components and stakeholder engagement for traffic safety planning. Prior to joining Jacobs, Cheri served 4 years as the Minnesota Governor’s Representative for Highway Safety and the Director of the Office of Traffic Safety for the Minnesota Department of Public Safety. Highlights of her public service involve strengthening Minnesota traffic safety policy including the passage of Primary Enforcement of Seat Belt Law, DWI Ignition Interlock law, enhanced booster seat and Graduated Drivers License laws, and no text and accessing web while driving law. In addition, she worked to strengthen and provide structure to the nationally recognized Minnesota Toward Zero Deaths Program. Cheri holds a Masters degree in Adult Education and Organization Development from the University of Minnesota.

Renae Kuehl, Senior Associate (SRF Consulting Group, Inc)
rkuehl@srfconsulting.com

Renae is a Senior Associate with SRF Consulting Group, and has more than 18 years of traffic, transportation safety, and transportation research related experience. Renae is a registered Professional Engineer and Professional Traffic Operations Engineer. She has a Bachelor of Science degree in Civil Engineering from the University of Minnesota. She has experience with a traffic safety audits, plans and analysis, including statewide safety analysis for state and county roadways.
Vision Zero Workshop

Dickinson: April 17, 2018

Karin Mongeon, NDDOT
Jane Berger, NDDOT
Cheri Marti, Jacobs
Howard Preston, Jacobs

Welcome and Introductions
**SHSP Regional Workshop Goals**

1. To deepen safety stakeholder understanding of:
   - North Dakota’s Vision Zero initiative and the relationship with the ND SHSP Update.
   - North Dakota’s severe crashes, causal factors, and priority safety emphasis areas.
   - Proven traffic safety strategies to reduce severe crashes

2. To solicit stakeholder perspectives of and input to:
   - Safety emphasis area challenges
   - Safety strategies and recommended priorities

3. To expand safety stakeholder engagement in ND SHSP Implementation.

**Workshop Agenda**

8:30 AM  Welcome and Introductions
   - North Dakota’s Vision Zero Initiative
   - Overview of North Dakota’s Strategic Highway Safety Plan
   - Stakeholder Discussion: *What is important to incorporate in the updated Vision Zero Plan?*

10:00  Break
   - Overview of Severe Crash Data and Identification of Priority Emphasis Areas
   - Stakeholder Discussion: Safety Strategies - *Infrastructure*

11:45 AM  Lunch (on your own)
1:00 PM  Stakeholder Discussion: Safety Strategies - *Behavioral*
   - Stakeholder Strategy Prioritization and Break
   - Prioritization Debrief
   - Workshop Wrap Up: Next Steps and Staying Connected

3:30 PM  Adjourn
Handout Review

1) Agenda  
2) Team Bios  
3) Participant List  
4) PPT Slides  
5) EA Table  
6) EA Fact Sheets  
7) Lane Departure Strategy Table  
8) Unsignalized Intersection Strategy Table  
9) Signalized Intersection Strategy Table  
10) Impaired Driving Strategy Table  
11) Unbelted Strategy Table  
12) Young Driver Strategy Table  
13) Speed/Aggressive Driving Strategy Table  
14) Evaluation Form

*Forms available for Law Enforcement POST credits*

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**Vision Zero Initiative**

VISION ZERO

What is Vision Zero?

- The State of North Dakota is calling for an end to motor vehicle crash fatalities and serious injuries through Vision Zero.
- Every life matters.
- Crashes are not accidents!
- Crashes are preventable.
  - Ninety-four percent (94%) of motor vehicle crashes are due in part to human error.

Vision Zero Video

How many people are killed on America's roads each year?
Why Vision Zero?

- Interdisciplinary effort involving state agencies and public and private sector partners.
- Leadership commitment to a comprehensive, multidisciplinary, aggressive and proactive approach to improving safety.
- Establishes a culture of personal responsibility behind the wheel, where motor vehicle fatalities and serious injuries are recognized as preventable and no longer tolerated as acceptable.

Vision Zero Overview

Vision Zero applies proven strategies including:

(1) Widespread public education/outreach
(2) Working with the legislature to ensure state laws represent best practices in traffic safety
(3) High visibility enforcement of existing laws
(4) Technology advancements
(5) Infrastructure/road safety improvements
How Will We Achieve Vision Zero?

• Through the North Dakota Strategic Highway Safety Plan (SHSP) and process. An SHSP is:
  – A statewide, coordinated safety plan that provides a comprehensive framework and specific goals and objectives to reduce fatalities and serious injuries on all public roads.
  – A federal requirement (23 U.S.C. § 148) and a major part of the core Highway Safety Improvement Program (HSIP).
• State DOTs are responsible to meet SHSP requirements.
SHSP Structure

Executive Leadership Team

Steering Committee

Emphasis Area Teams

- Lane Departure
- Unbelted Vehicle Occupant
- Impaired Driving
- Speed/Aggressive Driving
- Young Drivers
- Intersections

SHSP Emphasis Area Teams

- Establish EA-related goals
- Frame challenges
- Identify safety strategies and recommended priorities
- Identify lead agency/partner for strategy implementation

*Signup sheets to get involved with behavioral EA teams will be passed around
SHSP Task: Vision Zero Program Framework

Common themes of comprehensive traffic safety programs

- Zero vision and goal setting
- Leadership and safety culture
- Focused safety priorities and strategies
- Supporting program structure
- Key partner/stakeholder engagement and communication
- Technical assistance and training
- Implementation and progress monitoring

SHSP Update Requirements
SHSP Update

• North Dakota 2013 SHSP
• States must complete an SHSP update no later than 5 years from the previous approved version.
• SHSP updates must meet the same SHSP requirements and approvals.

SHSP Update Requirements

Consultative Approach
• Coordination/engagement with a multi-disciplinary group of stakeholders
SHSP Update Requirements

Data Driven Analytical Process

- Use crash data to support a three-level prioritization exercise across both state and local road systems that identifies/prioritizes Crash Types
- Safety Strategies/Countermeasures & Facility Types (rural vs. urban, state vs. local roads, 2-lane vs. multi-lane roads, conventional roads vs. freeways, etc.)

SHSP Update Requirements

Performance Based Short Term Goals

- Adoption of performance based goals
  - Number & rate of fatalities, number & rate of serious injuries & number of non-motorized (pedestrians and bicycles) fatalities and serious injuries

SET GOALS

1. 
2. 
3. 
SHSP Update Requirements

**Multi-disciplinary**
- Address Education, Enforcement, Engineering and Emergency Services

**Special Requirements**
- Define High Risk Rural Roads & develop strategies/countermeasures to address older driver & pedestrian safety

**SHSP Update & Approval**
North Dakota’s SHSP Process

Program Assessment

Crash Analysis ➔ Select Safety Emphasis Areas ➔ Develop Comprehensive List of Safety Strategies ➔ Regional Safety Workshops

Identify Short List of Critical Strategies ➔ Identify Safety Project Categories ➔ Update North Dakota’s SHSP

2013 SHSP Implementation: Example Highlights
Strategy Effectiveness

• All safety strategies are NOT equal from the perspective of effectiveness or cost
• Known effectiveness about various safety strategies helps support the identification, prioritization and adoption of the most important strategies as part of the data driven process.

AASHTO Provides National Direction

• Goal of a strategic plan for highway safety is to positively impact the nation’s (and state’s) present and predicted statistics on vehicular related death and injury
• Use a data driven process
• Published in 2004; implementation is now the focus
AASHTO’s Strategic Highway Safety Plan

- 22 Emphasis Areas (“Goals”)
- A “comprehensive approach” to reducing highway fatalities
- To be implemented across all jurisdictions (state, county, municipal, and tribal lands)

Safety Strategies Overview: NCHRP Report 500

- A series of comprehensive guides intended to facilitate agency implementation of SHSP objectives
- Focus is on low-cost, readily implementable strategies
  - Proven Effective
  - Tried
  - Experimental
Safety Strategies Overview: NHTSA’s Countermeasures That Work

• Assists State Highway Safety Offices (SHSOs) in selecting effective, science-based traffic safety countermeasures.
• Summarizes use, effectiveness, costs, and implementation time
• References research summaries & individual studies, highlighting experience and knowledge gained by others

Screening AASHTO’s 22 Key Emphasis Areas

The Critical Emphasis Areas will represent the areas with the greatest potential to reduce the number of traffic fatalities in North Dakota.
Screening - Initial Strategies

- AASHTO’s SHSP, NCHRP Report 500 Implementation Guidelines, NHTSA’s Countermeasures That Work, and input from Safety Partners.

- The strategies will be screened using:
  - Crash data
  - Effectiveness
  - Cost
  - Input from Safety Workshop

- The Selected Strategies should have the greatest potential to reduce the number of traffic fatalities.

Infrastructure: Local Road Safety Plans

Implementation Highlight

- Recognizing over 50 percent of severe crashes occur on local roads, NDDOT partnered with counties, cities, and tribes to prepare Local Road Safety Plans for each entity
  - Data driven analysis to identify at-risk locations and low-cost systemic safety projects (signing, marking, lighting) for locals to easily submit projects through NDDOT federal Highway Safety Improvement Program.
  - To date 25 counties, 4 major cities, and 3 tribes have participated
  - Approximately $16M in projects programmed
Where can Data-Driven Safety Analysis (DDSA) be applied in the Project Development Process?

What is a Systemic Risk Assessment?

- Analytical approach identifies and prioritizes safety deficiencies on roads based on risk of crash (vs. density of crashes).
- Identifies risk factors based on roadway and traffic characteristics common to locations with fatal and injury crash histories.
- Prioritizes the road system for safety investment by documenting the number of risk factors present at each location. The greater the number of risk factors present at any location, the greater the risk and the higher the priority as a candidate for safety investment.
- Proactive deployment of safety projects on at-risk locations (vs. reacting to where crashes occur)
What is the benefit of a systemic process?

• **It works** – it is approved by FHWA as a data-driven process to identify safety improvement projects, including those considered eligible for Highway Safety Improvement Program (HSIP) funding.

• **It leads to Implementation** – the process has identified more than $300M of low-cost, local safety improvement projects in Minnesota.

• **It allows agencies to proactively deploy safety projects on at-risk locations.**

With the systemic process, the answer to “How many people have to die before you do something?” – is **Zero**!

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**Driver/Passenger Behavior**

• **Strategies:**

  – Education/Outreach
    - Reaching people where they live, work and play

  – Enforcement

  – Engineering

  – Emergency Medical Services

  – Environmental Strategies
Driver/Passenger Behavior – Implementation Example/Highlight

- Law enforcement conduct 11 high visibility enforcement (HVE) campaigns per year.
  - Click It or Ticket – 3 HVE campaigns per year
  - Drive Sober or Get Pulled Over – 3 HVE campaigns per year
  - Underage drinking enforcement – 3 HVE campaigns per year
  - U Drive. U Text. U Pay. – 2 HVE campaigns per year

- Campaigns are coupled with extensive paid, earned and social media.

Goal: To deter high-risk behavior through increased perception of being caught.

Driver/Passenger Behavior - Implementation Example/Highlight

- Impaired driving HVE media – Taylor Berhow campaign
- Taylor drove after drinking alcohol on October 29, 2011 and killed his three friends. He shares his story to deter others from driving impaired.
- Features TV, radio, digital and social media ads.
- Has had the most extensive reach of any campaign funded to date.
Driver/Passenger Behavior

ON OCTOBER 29, 2011 IN MANDAN, NORTH DAKOTA TAYLOR BERHOW CHOSE TO DRINK AND DRIVE.

SHSP Stakeholder Engagement
Stakeholder Engagement/Communication

- **Stakeholders**
  - SHSP Executive Leadership Team
  - SHSP Steering Committee
  - SHSP Emphasis Areas teams
  - Traffic Safety Partners Network
  - Regional Safety Stakeholders (not the VSP regional workshops)
  - Statewide Safety Stakeholders (not Traffic Safety Partners Council)
  - Other Safety Plan Representatives

**SHSP PROJECT TEAM**

**STRATEGIC HIGHWAY SAFETY PLAN**

**Regional Workshop Dates/Locations**

- Wednesday March 21, 2018
  - Fargo Dome (Fargo)
- Thursday, March 22, 2018
  - Ramada Grand Forks (Grand Forks)
- Tuesday, April 3, 2018
  - Ward County Courthouse (Minot)
- Wednesday, April 4, 2018
  - Ramkota (Bismarck)
- Tuesday, April 17, 2018
  - Dickinson City Hall (Dickinson)
- Wednesday, April 18, 2018
  - Ernie French Center (Williston)

**RSVP at [https://www.surveymonkey.com/r/SHSPWorkshops](https://www.surveymonkey.com/r/SHSPWorkshops)**
## Profile of Stakeholder Involvement

- Vision Zero Executive Leadership Team and Steering Committee members
- Law Enforcement – State, county, city and tribal
- Health Care
  - NDDoH personnel, emergency medical services providers, public health, etc.
- Elected Officials
  - State legislators, county board members, city council members, auditors, mayors
- Transportation Agency Practitioners
  - NDDOT personnel, county/city engineering, planning and road supervisors
- Motor Carriers
- Tribal Representatives
- Judges and State Attorneys, Prosecutors
- National Parks
- Federal Partners – National Highway Traffic Safety Administration (NHTSA) and Federal Highway Administration (FHWA)
- Education Representatives
  - Vision Zero Partner Network, drivers education instructors, insurance agencies, behavioral health, ND Safety Council, non-motorist groups, etc.

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**Stakeholder Discussion:** What is important to incorporate in the updated Vision Zero strategic safety plan?
Overview of Crash Data: Trends and Priority Emphasis Area

Statewide Priority Emphasis Areas

Statewide Emphasis Area Table

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<th>Local System</th>
<th>Statewide</th>
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<td>Severe Injures</td>
<td>All Injures</td>
<td>Severe Injures</td>
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<td></td>
<td>Frequency</td>
<td>Percentage</td>
<td>Frequency</td>
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<td>Work Zone</td>
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Total: 1,354 | 86.1% | 5,294 | 36.3% | 1,384 | 10.4% | 17,720 | 121.4% | 35,548 | 264.4% |

Note: The table includes data from 2012-2018.
### Fatal + Severe Injury Crashes & Rates
#### State vs. Local

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### Fatal + Severe Injury Crashes & Rates
#### Rural vs. Urban

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### Fatal + Severe Injury Crashes & Rates
#### Oil County vs. Non-Oil County

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</tbody>
</table>

| **Crash Frequency** | | | | | | | | | |
| **Non-Oil County** | | | | | | | | | |
| K             | 0.027 | 0.030 | 0.024 | 0.020 | 0.016 | 0.011 | 0.013 | 0.015 | 0.017 |
| A             | 0.087 | 0.071 | 0.065 | 0.055 | 0.055 | 0.053 | 0.047 | 0.059 | 0.062 |
| K+A           | 0.114 | 0.102 | 0.089 | 0.075 | 0.070 | 0.064 | 0.061 | 0.074 | 0.078 |
| **MVMT**      | 5,516 | 5,673 | 5,808 | 5,836 | 5,967 | 6,054 | 6,094 | 6,095 | 6,258 |

### Fatalities (Number of People) – Statewide vs. National, 5-year Rolling Average

- **North Dakota - Historic**
- **North Dakota - 5-Year Rolling Average**
- **National - Historic**
- **National - 5-Year Rolling Average**
Fatalities and Severe Injuries (Number of People) – Non-Oil County vs. Oil County, 5-year Rolling Average

Fatalities and Severe Injuries (Number of People) – Local vs. State System, 5-year Rolling Average
Fatalities and Severe Injuries (Number of People) – Urban vs. Rural, 5-year Rolling Average

Emphasis Area: Fatalities and Severe Injuries Intersection Trendline

*Example Trendline – all Emphasis Areas are experiencing the same trend
Interact with the Presentation

Text to: 22333
Message: SRFCONSULTING01

Via web browser, go to:
PollEv.com/srfconsulting01

Interact with the Presentation

When texting a response, type the letter as seen on the slide

When a question is provided in the web browser, check your response
Infrastructure Safety Strategies:
Lane Departure

US 52 and a couple of other highway corridors with high severe crashes will be identified through review of crash and citation data.

Concept of designating safety corridors
  - collaborative approach to bring heightened awareness and focus to safety on specific corridors.
  - 4 E’s
    - Enforcement, Education, Engineering, EMS
**Infrastructure Strategies:**

**Lane Departure – (E1) Safety Corridor**

- The designated safety corridors may receive:
  - signage identifying them as safety corridors
  - heightened enforcement of all traffic violations occurring within the corridor
  - application of low cost corridor wide infrastructure safety solutions (may include enhanced signing, pavement marking, lighting, turn lanes, etc)
  - public education about the corridors

- Corridors will be monitored for effectiveness in severe crash reduction and may be undesignated after a period of time.

**Crash Reduction Factor**
- Experimental

**Typical Installation Costs**
- Varies ($5000 per mile to ?)

---

**Infrastructure Strategies:**

**Lane Departure – (D1) Rural Corridor Delineation**

**Centerline Rumble Strips**

**Crash Reduction Factor**
- 40% head-on/sideswipe crashes

**Typical Installation Costs**
- $3,600 per mile
**Infrastructure Strategies:**

**Lane Departure – (A2) Rural Corridor Delineation**

**Shoulder/Edge Line Rumble Strips**

Crash Reduction Factor
- 20% run off road crashes

**Typical Installation Costs**
- $5,850 per mile

---

**Infrastructure Strategies:**

**Lane Departure – (A3) Rural Corridor Delineation**

**Delineators**

Crash Reduction Factor
- 18% to 34% non-intersection, head-on, run-off-road, sideswipe, nighttime crash types

**Typical Installation Costs**
- $500 per curve
**Infrastructure Strategies:**
**Lane Departure – (A6) Rural Corridor Shoulder Improvements**

**Shoulder Paving**

**Crash Reduction Factor**
- 20% to 30% run-off-the-road crashes (with shoulder rumble) (2’ only)

**Typical Installation Costs**
- $54,000 per mile + $5,850 per mile (for Edge Rumble)

---

**Infrastructure Strategies:**
**Lane Departure – (A6) Rural Corridor Shoulder Improvements**

**Eliminating Drop Offs**

**Crash Reduction Factor**
- 5% to 10%

**Typical Installation Costs**
- $10,000 to $20,000 per mile
**Infrastructure Strategies:**

**Lane Departure – (D2) Center Buffer between Opposing Lanes**

- **Crash Reduction Factor**
  - 50% for all crashes &
  - 100% for head-on crashes

- **Typical Installation Costs**
  - $150,000 to $500,000 per mile

**Infrastructure Strategies:**

**Lane Departure – (D2) Road Diet (3- and 5-Lane Conversions)**

- **Crash Reduction Factor**
  - 30% to 50%

- **Typical Installation Costs**
  - $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)
Infrastructure Safety Strategies
Intersections

Infrastructure Strategies:
Unsignalized Intersection– (A1 & B6) Access Management

Crash Reduction Factor
- 5% to 31%

Before

After
**Infrastructure Strategies:**

**Unsignalized Intersection – (D4) Urbanization (Make it Feel Urban)**

- **Crash Reduction Factor**
  - Not Available (Tried)

- **Typical Installation Costs**
  - $500,000 to $1,000,000 per mile

**Infrastructure Strategies:**

**Unsignalized Intersection – (B11) Restricted Crossing U-Turn (RCUT) Intersections**

- **Crash Reduction Factor**
  - 17% all crashes
  - 100% angle crashes

- **Typical Installation Costs**
  - $750,000 per intersection
**Infrastructure Strategies:**

**Unsignalized Intersection - (F1) Roundabouts**

- **Crash Reduction Factor**
  - 20% to 50% all crashes
  - 60% to 90% right-angle crashes

- **Typical Installation Costs**
  - $1,000,000 per intersection

**ND 22 & ND 200 roundabout in Killdeer, ND**

---

**Infrastructure Strategies:**

**Unsignalized Intersection (F1) Urban Mini-Roundabout**

- **Crash Reduction Factor**
  - 20% to 50% all crashes
  - 60% to 90% right-angle crashes

- **Typical Installation Costs**
  - $40,000 - 500,000
**Infrastructure Strategies:**
Unsignalized Intersection – (D3) Rural Intersection Conflict Warning System (RICWS)

Crash Reduction Factor
- 50% all crashes
- 75% severe right angle crashes

Typical Installation Costs
- $75,000 to $125,000 per intersection

---

**Infrastructure Strategies:**
Unsignalized Intersection – (D1) Traffic Calming - Zig Zag Pavement Markings

Crash Reduction Factor
- Not Available

Typical Installation Costs
- $2,850

Figure 10. Zigzag Markings at Belmont Ridge Road
## Infrastructure Safety Strategies

### LRSP Projects – Rural and Urban Areas

**Program Focus:** Deployment of proven, effective & low cost strategies

<table>
<thead>
<tr>
<th>Rural</th>
<th>Urban</th>
</tr>
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<tbody>
<tr>
<td>• Enhanced Edgelines</td>
<td>• Traffic Signal Confirmation Lights</td>
</tr>
<tr>
<td>• Intersection Street Lighting</td>
<td>• Curb Extensions</td>
</tr>
<tr>
<td>• Chevrons</td>
<td></td>
</tr>
</tbody>
</table>
**Infrastructure Strategies:**

**Lane Departure – (A2) LRSP Projects (Rural)**

**Enhanced Edgelines (6” & 8”)**

**Crash Reduction Factor**
- 10% to 45% all rural serious crashes (6”)

**Typical Installation Costs**
- $2,000 per mile

**Infrastructure Strategies:**

**Unsignalized Intersection – (D2) LRSP Projects (Rural)**

**Intersection Destination Lighting**

**Crash Reduction Factor**
- 25% to 40% of nighttime crashes

**Typical Installation Costs**
- $10,000 per light
**Infrastructure Strategies:**

**Lane Departure – (A3) LRSP Projects (Rural)**

**Chevrons**

**Crash Reduction Factor**
- 20% to 30%

**Typical Installation Costs**
- $3,960 per curve

**Infrastructure Strategies:**

**Signalized Intersection – (E1) LRSP Projects (Urban)**

**Traffic Signal Confirmation Lights**

**Crash Reduction Factor**
- 25% to 84% in violations
- 9% angle crashes

**Typical Installation Costs**
- $1,200 per two approaches
**Infrastructure Strategies:**
Unsignalized Intersection – (B10) LRSP Projects (Urban)

**Curb Extension**

**Crash Reduction Factor**
- Increase in vehicles yielding to pedestrians

**Typical Installation Costs**
- $36,000 per corner

**Behavioral Safety Strategies: Impaired Driving**
Behavioral Strategies:
North Dakota Impaired Facts

- 33% of severe injuries
- 55% severe injuries, younger drivers age 20-39; 69% male drivers
- 63% of severe crashes unbelted
- 45% of fatalities involve an impaired driver vs. 28% US
- 36% of impaired-driving fatalities involved driver BAC of .15 > vs. 19% US

Good News – ND Impaired-related fatalities declining since 2012

What more will ND do to continue the downward trend line?

Behavioral Strategies:
Impaired – (A3) Employ alcohol screening and brief interventions in health care settings

Capitalize on the “teachable moment” following a crash
- Patients are screened for alcohol use problems
- Brief interventions counsel patients on alcohol’s affect on injury risk & overall health

Proven: Reduces drinking and self-reported drinking and driving
**Behavioral Strategies:**

**Impaired - (A4) Mandate alcohol server/seller training as a condition of alcohol licensure.**

- Prevent serving/selling to intoxicated or underage customers
- Server/seller training - Sell, prepare, dispense, serve or otherwise deliver alcoholic beverages statewide.

![Server/seller training image]

**Behavioral Strategies:**

**Impaired - (B1) Strengthen public perceived risk of arrest through highly visible enforcement (HVE); (B2) Maintain high visibility sobriety checkpoints**

HVE + Checkpoints Goal: Deterrence through raising the perceived risk of arrest

- Highly visible enforcement + strong public outreach
- Multiple jurisdictions, multiple squads
- Paid, earned/free, and social media outreach (pre and post-enforcement)

Proven: Sustained highly visible enforcement or numerous checkpoints reduce alcohol-related fatalities 11% - 20%.
**Behavioral Strategies:**
Impaired – (C1) Strengthen repeat DUI offender monitoring

ND 24/7 Sobriety Program:
- No alcohol use, no bars, 24/7
- Sobriety testing with law enforcement 2X day, 7 days/week
- Monitoring: Breath testing, SCRAM bracelet, drug patch
- Avoid jail while successfully in the program

Proven: In ND, those successfully completing program, 96.1% did not reoffend.

---

**Behavioral Strategies:**
Impaired – (C1) Strengthen repeat DUI offender monitoring

ND’s Strengthened DUI law:
- Increased fines for DUI convictions
- Increased jail time for second and subsequent DUI offenses
- Requires repeat DUI offenders to participate in ND’s 24/7 Sobriety Program for one year
**Behavioral Strategies:**
**Impaired – (C2) Expand DUI Courts**

Highly intensive supervision for high-risk DUI offenders
- Regular case reviews - judge, prosecutor, probation and treatment
- Regular offender court appearances
- Frequent urine testing
- Random visits from law enforcement
- Treatment required
- Community service

Proven: Reduces re-offense offense by approx. 50%; Georgia study – DUI Court 9% re-offended vs. 24% traditional programs

---

**Behavioral Strategies:**
**Impaired – (C3) Implement an Ignition Interlock Program**

Separates the drinking driver from the vehicle
- Analyzes a driver’s breath; disables the engine if alcohol detected
- A condition to regain driving privileges
- Provides a pathway for legal driving

Proven: Just released - IIHS Study: reduced drunk crash fatalities by 16%. Since 2006 and "All-Offender" law, New Mexico reduced drunk driving fatalities by 22%.
Behavioral Strategies:
Impaired – (C7) Conduct a comprehensive assessment of administrative licensing sanctions for both alcohol and drug-impaired driving.

Swift and certain penalty for DUI vs. lengthy and uncertain outcomes of criminal process
• Administrative license suspension (ALS) or revocation (ALR)
• Automatic sanction for BAC or drug test refusal and BAC test failure
• Arresting officer takes license
• Immediate penalty - no proof of guilt required
• Serves as a strong deterrent
Proven; ALS/ALR has reduced alcohol-related fatal crash involvement by 5%

Behavioral Safety Strategies: Occupant Protection/Belt Use
Behavioral Strategies:
Occupant Protection/Belt Use – (A2) Conduct enhanced enforcement and focused public outreach for low belt use communities

- ND **unbelted severe injuries** = 49%
- Rural Roads: 84%
- Oil Counties: 51%
- Younger motorists: 29% age 20-29
- Native Americans fatalities 2016: 72%

- ND **low belt use audiences**
  - W Region: 74.7% belt use (East: 82.2%)
  - Males: 73.5% (Females: 86.1%)
  - Males in truck: 68.9% (F in trucks: 83%)
  - Rural towns: M - 38.6%, (F – 51.8%)

**Goal of Primary Belt Law:** More North Dakotans buckle up... walk away from a crash

- ND belt use rate = 79.3% (National belt use = 90.1%)
- In ND, 6 out of 10 people killed in a crash were **unbelted**
- When lap/shoulder belts used, fatal injury reduced by 45-65%
- Primary Seat Belt Enforcement: 34 states + District of Columbia
- 62% favor primary seat belt law in North Dakota

Proven: In two years, MN primary seat belt law resulted in between 68 and 92 fewer deaths and between 320 and 550 fewer severe injuries.
### Behavioral Strategies:
**Occupant Protection/Belt Use – (A6)** Promote peer-to-peer outreach to dispel misperceptions of peer risk taking, particularly in rural communities

- **Key:** Using peer influences to shape what behaviors are socially acceptable
- **Correct misperceptions** – Educate drivers on peers’ “actual” vs. “perceived” risk behavior
  - Perceived: Only 58% of ND survey respondents indicated others use seat belt nearly always/always
  - Actual: Nearly 80% wear their seat belt
- **Engage** – Give teens responsibility for creating safe driving messages

---

### Behavioral Strategies:

North Dakota has an active network of CPS inspection stations

- Located in 35 of ND’s 53 counties serving 92% of the population
- Primarily serve rural and Native American communities
- Over 240 Certified Child Passenger Safety Technicians offering training/assistance
Behavioral Safety Strategies: Young Driver

Insurance Institute for Highway Safety - GDL calculator
Estimates the impact of strengthening key graduated driver licensing provisions on fatal crash rates among young drivers for each state.

• A4 – Min. age of 15 for permit = 13% reduction in ND fatal crash rate
• A6 – Implement passenger restrictions: 1 = 7% reduction in ND fatal rate
  0 = 21% reduction
• A8 – Min age of 16 for restricted license = 13% reduction in ND fatal rate
  Min age of 17 for restricted license = 25% reduction

http://www.iihs.org/iihs/topics/laws/gdl_calculator?topicName=teenagers
**Behavioral Strategies:**

**Young Driver - (C1) Require parent education as a driver education classroom component**

Parent component helps to actively engage parents and to understand:
- Their role in monitoring/supervising their teen’s skill development
- Teen driving risks and
- GDL safety provisions and their role
- How to promote effective communication with their teen

---

**Behavioral Strategies:**

**Young Driver – (B4) Enact "hands-free" law to aid enforcement.**

- **Hands-Free Law:** 5 states + D.C.; all are primary enforcement laws
- Teen drivers age 15-19, 43% text while driving, 61% read texts while driving (Teen Driver Survey, 2012)
- 91% of college students reported to have sent text messages while driving (He et al., 2015).
- Young drivers, aged 18-20, are involved in more crashes involving phone usage while driving, than any other age group (NHTSA).
Behavioral Strategies:
Young Driver – (C2) Publicize technology solutions to promote safe driving

Younger drivers most at risk - overestimate abilities & underestimate dangers

Technology Examples:
• AT&T’s DriveMode (Free): Auto launch; blocks texts, calls, alerts; auto replies, parent notified if disabled (Android and iPhone)
• Cellcontrol ($129.): See above + web access, excessive maneuvers (speed, braking, acceleration), driver performance reports for parental monitoring

Behavioral Safety Strategies: Speed/Aggressive Driving
### Behavioral Strategies:

**Speed/Aggressive Driving - (A2)** Explore pilot automated enforcement projects, coupled with public outreach; assess impact and public acceptance.

- Create transparent, highly visible, community-supported pilot enforcement projects
- Overwhelming majority support us in construction and school zones
- Solicit public feedback and assess response and crash impact
- Purpose is to augment – not replace – traditional enforcement

Proven: 10-20% reduction in speed-related fatalities

### Behavioral Strategies

**Speed/Aggressive Driving - (B1)** Enact strengthened fines and penalties.

- Speed fines in North Dakota are lower than Montana, South Dakota, and Minnesota.
- For high-risk, repeat offenders, most effective penalties are imposed by licensing agency (license suspension/revocation) vs. uncertain court decision.
Stakeholder Strategy Prioritization

Prioritization Debrief
Next Steps

- Vision Zero Workshops
  - March 21 and 22
  - April 3 and 4
  - April 17 and 18
- May 2018 - Workshop input shared with Vision Zero/SHSP Executive and Steering Committees
- July 1, 2018 - Draft Vision Zero plan/SHSP for stakeholder review and comment
- August 1, 2018 – Final Vision Zero plan/SHSP submitted to the Federal Highway Administration (FHWA) North Dakota Division for approval
- October 31, 2018 – Vision Zero Framework
- Stakeholder involvement for plan implementation
- Sign up to be part of an EA team

Questions?

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Safety Division Director
North Dakota Department of Transportation
701-328-4434
kamongeon@nd.gov

Thank you for your participation!

We value your feedback.

Please complete the workshop evaluation – last page in your folder.
ND Statewide Priority Emphasis Areas

<table>
<thead>
<tr>
<th>Emphasis Area</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>Young Driver</td>
<td>219</td>
<td>13.7%</td>
<td>1,778</td>
<td>19.5%</td>
<td>382</td>
<td>22.5%</td>
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Note: The table includes crashes from 2012-2016

3/22/2018
## Lane Departure Strategies - 58% of all severe injuries during 5-year period

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Strategies</th>
<th>Relative Cost to Implement and Operate</th>
<th>Effectiveness</th>
<th>Included in 2013 SHSP</th>
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<tbody>
<tr>
<td>A - Keep vehicles from encroaching on the roadside</td>
<td>A1 - Install shoulder rumble strips</td>
<td>Low</td>
<td>Tried</td>
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<tr>
<td></td>
<td>A2 - Install edge lines &quot;profile marking&quot;, edge line rumble strips, modified shoulder rumble strips, 6-inch edge line, or embedded wet-reflective pavement markings on section with narrow or no paved shoulders</td>
<td>Low</td>
<td>Experimental</td>
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<td></td>
<td>A3 - Provide enhanced shoulders, lighting, delineation (for example, Chevrons), or pavement markings for sharp horizontal curves</td>
<td>Low</td>
<td>Tried / Proven</td>
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<td></td>
<td>A4 - Provide improved highway geometry for horizontal curves</td>
<td>Moderate</td>
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<td></td>
<td>A5 - Provide skid-resistance pavement surfaces</td>
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<td>A6 - Apply shoulder treatments</td>
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<td></td>
<td>*Eliminate shoulder drop-offs from paved road to unpaved shoulder</td>
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<tr>
<td></td>
<td>*Shoulder edge</td>
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<td></td>
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<tr>
<td></td>
<td>*Widen and/or pave shoulders</td>
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<tr>
<td>B - Minimize the likelihood of crashing into an object or overturning if the vehicle travels off the shoulder</td>
<td>B1 - Design safer slopes and ditches to prevent rollovers</td>
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<td>Proven</td>
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<td></td>
<td>B2 - Remove/relocate objects in hazardous locations</td>
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<td>C - Reduce the severity of the crash</td>
<td>C1 - Improve design and application of barrier and attenuation systems</td>
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<td></td>
</tr>
<tr>
<td>D - Reduce the likelihood of a head-on vehicles collision</td>
<td>D1 - Install centerline rumble strips for two-lane roads</td>
<td>Low</td>
<td>Proven</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D2 - Install center buffers between opposing lanes</td>
<td>Moderate to High</td>
<td>Tried</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D3 - Install cable median barrier for narrow-width medians &amp; multilane roads</td>
<td>Moderate to High</td>
<td>Proven</td>
<td></td>
</tr>
<tr>
<td>E – Reduce number and severity of crashes</td>
<td>E1 - Designate as Safety Corridor - heightened enforcement PLUS implementation of corridor wide, low-cost infrastructure safety solutions</td>
<td>Moderate to High</td>
<td>Tried</td>
<td></td>
</tr>
</tbody>
</table>
### Unsignalized Intersection Strategies - 29% of all severe injuries during 5-year period

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Strategies</th>
<th>Relative Cost to Implement and Operate</th>
<th>Effectiveness</th>
<th>Included in 2013 SHSP</th>
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</thead>
<tbody>
<tr>
<td>A - Improve management of access near unsignalized intersections</td>
<td>A1 - Implement driveway closure/relocations (Access Management)</td>
<td>Moderate</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td>B - Reduce the frequency and severity of intersection conflicts through geometric design improvements</td>
<td>B1 - Provide left-turn lanes at intersections</td>
<td>Moderate</td>
<td>Proven</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B2 - Provide offset left-turn lanes at intersections</td>
<td>Moderate to High</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B3 - Provide acceleration lanes at divided highway intersections</td>
<td>Moderate</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B4 - Provide right-turn lanes at intersections</td>
<td>Moderate</td>
<td>Proven</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B5 - Provide offset right-turn lanes at intersections</td>
<td>Moderate to High</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B6 - Channelize or close median openings to restrict or eliminate turning maneuvers (Access Management)</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B7 - Close or relocate “high-risk” intersections</td>
<td>High</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B8 - Convert Radial T Intersections</td>
<td>High</td>
<td>Tried</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B9 - Realign intersection approaches to reduce or eliminate intersection skew</td>
<td>High</td>
<td>Proven</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B10 - Improve pedestrian and bicycle facilities to reduce conflicts between motorists and non-motorists (Curb Extensions &amp; Medians)</td>
<td>Moderate</td>
<td>Proven</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B11 – Convert Divided Intersections to Restricted Crossing U-Turn (RCUT)</td>
<td>Moderate to High</td>
<td>Proven</td>
<td></td>
</tr>
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</table>
## Unsignalized Intersection Strategies - 29% of all severe injuries during 5-year period

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<tr>
<td>C - Improve sight distance at unsignalized intersections</td>
<td>C1 - Clear sight triangle on stop- or yield-controlled approaches to intersections, including snow removal</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>D1 - Improve visibility of intersections by providing enhanced signing, delineation, or pavement markings/messages</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>D2 - Improve visibility of intersections by providing appropriate street lighting</td>
<td>Moderate to High</td>
<td>Proven</td>
<td>X</td>
</tr>
<tr>
<td>D - Improve driver awareness of intersections as viewed from the intersection approach</td>
<td>D3 - Install larger regulatory and warning signs at intersections, including the use of dynamic warning signs at appropriate intersections (LED Stop Signs &amp; Dynamic Intersection Conflict Warning Systems) (Dynamic Speed Feedback Signs)</td>
<td>Low to Moderate</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>D4 – Urbanization - Make it feel urban (curb &amp; gutter, street lights, sidewalks, etc.)</td>
<td>Moderate to High</td>
<td>Tried</td>
<td></td>
</tr>
<tr>
<td>F - Choose appropriate intersection traffic control to minimize crash frequency and severity</td>
<td>F1 - Construct roundabouts at appropriate locations</td>
<td>High</td>
<td>Proven</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>F2 – Convert to All-Way Stop</td>
<td>Low</td>
<td>Tried</td>
<td></td>
</tr>
</tbody>
</table>
### Signalized Intersection Strategies - 29% of all severe injuries during 5-year period

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</thead>
<tbody>
<tr>
<td>A - Reduce frequency and severity of intersection conflicts through traffic control and operational improvements</td>
<td>A1 - Employ multiphase signal operation (including Flashing Yellow Arrows)</td>
<td>Low</td>
<td>Tried / Proven</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A2 - Optimize clearance intervals</td>
<td>Low</td>
<td>Proven</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A3 - Restrict or eliminate turning maneuvers (including right turns on red)</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A4 - Employ signal coordination along a corridor or route</td>
<td>Moderate</td>
<td>Proven</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A5 - Provide countdown timers, advanced walk phase, and other low-cost pedestrian/bicycle facility improvements</td>
<td>Low</td>
<td>Tried / Proven</td>
<td>X</td>
</tr>
<tr>
<td>B - Reduce frequency and severity of intersection conflicts through geometric improvements</td>
<td>B1 - Provide/improve left-turn channelization</td>
<td>Moderate</td>
<td>Proven</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B2 - Provide/improve right-turn channelization</td>
<td>Moderate</td>
<td>Proven</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B3 - Improve geometry of pedestrian and bicycle facilities</td>
<td>Low</td>
<td>Tried / Proven</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B4 – Convert to Signalized Restricted Crossing U-Turn</td>
<td>High</td>
<td>Tried</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B5 – Convert T Intersections to Continuous Green T</td>
<td>Moderate to High</td>
<td>Tried</td>
<td></td>
</tr>
<tr>
<td>D - Improve driver awareness of intersections and signal control</td>
<td>D1 - Improve visibility of signals (overhead indications, 12” lenses, background shields, LED’s) and signs (mast arm mounted street names) at intersections</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td>E - Improve driver compliance with traffic control devices</td>
<td>E1 - Supplement conventional enforcement of red-light running with confirmation lights; include a public information campaign to increase awareness and compliance</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td>F - Improve access management near signalized intersections</td>
<td>F1 - Restrict access to properties using driveway closures or turn restrictions</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>F2 - Restrict cross-median access near intersections</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
</tr>
</tbody>
</table>
## Alcohol and/or Drug Related Strategies - 33% of all severe injuries during 5-year period

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<tbody>
<tr>
<td>A - Reduce excessive drinking and underage drinking</td>
<td>A1 - Conduct highly publicized compliance checks and server training for alcohol retailers and merchants to reduce sales to underage persons.</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A2 - Conduct public outreach on accessible safe-ride alternative transportation services.</td>
<td>Moderate</td>
<td>Tried</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A3 - Expand screening and brief interventions (SBI) in emergency settings.</td>
<td>Moderate</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A4 - Mandate alcohol server training as a condition of alcohol licensure.</td>
<td>Moderate</td>
<td>Tried</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>B - Strengthen enforcement to improve safety</td>
<td>B1 - Strengthen impaired driving detection and public perceived risk of arrest through sustained, well-publicized, highly visible impaired-driving enforcement, including sobriety checkpoints.</td>
<td>Moderate-High</td>
<td>Proven</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B2 - Maintain high visibility sobriety checkpoints to reduce impaired driving.</td>
<td>Moderate-High</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B3 - Strengthen the use of in-squad cameras to more successfully prosecute DWI arrests.</td>
<td>Moderate</td>
<td>Tried</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B4 - Publicize and enforce zero tolerance laws for drivers under age 21.</td>
<td>Moderate</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B5 - Expand the use of passive alcohol sensors for enforcement purposes.</td>
<td>Moderate</td>
<td>Tried</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B6 - Identify &amp; address Tribal issues in participating in DUI enforcement activities.</td>
<td>Low</td>
<td>Experimental</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B7 - Develop Tribal-State public safety agreements to provide concurrent jurisdiction with DUI arrest authority.</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B8 – Expand officer Advanced Roadside Impaired Driving Enforcement (ARIDE) training and officer use of Drug Recognition Experts (DRE) to detect and apprehend drug-impaired drivers.</td>
<td>Medium</td>
<td>Tried</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B9 – Move toward complete testing and reporting of drug testing information on fatality-injured drivers.</td>
<td>Medium</td>
<td>Tried</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
### Alcohol and/or Drug Related Strategies - 33% of all severe injuries during 5-year period

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<tbody>
<tr>
<td>C – Prosecute, impose sanctions on, and treat impaired offenders</td>
<td>C1 - Strengthen repeat DWI offender monitoring programs.</td>
<td>High</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C2 - Expand high-supervision DUI Courts for repeat offenders.</td>
<td>High</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C3 - Implement an Ignition Interlock program.</td>
<td>Moderate</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C4 - Remove the option for BAC Test refusal by making refusal a criminal offense.</td>
<td>Low</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C5 - Pursue increased penalties for high BAC offenders.</td>
<td>Low</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C6 - Explore limiting the scope of administrative hearings to relevant facts and issues.</td>
<td>Low</td>
<td>Tried</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>C7 - Conduct a comprehensive assessment of administrative licensing sanctions for both alcohol and drug-impaired driving.</td>
<td>Low</td>
<td>Proven/Tried</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C8 - Educate prosecutors and law enforcement on the importance of investigating and prosecuting impaired and drugged-driving cases.</td>
<td>Low</td>
<td>Tried</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>C9 - Identify approaches to effectively educate judges on DUI and drug enforcement protocol and the importance of investigating and prosecuting impaired driving cases.</td>
<td>Low</td>
<td>Tried</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>C10 – Enhance training for prosecutors in the successful prosecution of drug-impaired drivers.</td>
<td>Low</td>
<td>Tried</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
## Unbelted Vehicle Occupants Strategies – 49% of all sever injuries during 5-year period

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<tbody>
<tr>
<td>A - Maximize use of occupant restraints by all vehicle occupants</td>
<td>A1 - Conduct statewide high visibility and highly publicized targeted enforcement campaigns to maximize belt and child restraint use, including nighttime enforcement.</td>
<td>Moderate-High</td>
<td>Proven</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A2 - Conduct enhanced enforcement and focused public outreach for low belt use communities including rural areas and North Dakota’s western region as well as low belt use audiences.</td>
<td>Moderate-High</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A3 - Enact primary seat belt legislation that includes primary enforcement of belt use for all passengers in all seating positions.</td>
<td>Low</td>
<td>Proven</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A4 - Strengthen penalties for lack of seat belt use.</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A5 - Conduct targeted and highly publicized enforcement for drivers under 18 at school locations.</td>
<td>Moderate</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A6 - Promote peer-to-peer outreach to dispel misperceptions of peer risk taking, particularly in rural communities.</td>
<td>Low</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A7 - Conduct enforcement outreach to tribal governments to enforce tribal primary seatbelt law and outreach to rural law enforcement to enforce secondary seatbelt law.</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A8 - Conduct outreach on unbelted risks and OP benefits to educational institutions including elementary schools in geographical areas with low belt use and tribal colleges.</td>
<td>Moderate</td>
<td>Experimental</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>B - Insure that restraints, especially child and infant restraints, are properly used</td>
<td>B1 - Strengthen child booster safety law for children up to age 8.</td>
<td>Low</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B2 - Conduct high-profile “Child Passenger Safety” inspection clinics events at multiple community locations to educate on the proper use of restraint devices. Incorporate assessment of inspection clinics’ effectiveness to affect proper child restraint.</td>
<td>Low</td>
<td>Proven</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B3 - Promote statewide education for rear-facing child restraint through age 2 and other child restraint best practices (e.g., booster seat until age 9, transport children 12 and younger in the back seat, etc.).</td>
<td>Moderate</td>
<td>Tried</td>
<td>X</td>
<td></td>
</tr>
</tbody>
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### Unbelted Vehicle Occupants Strategies – 49% of all server injuries during 5-year period

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<tr>
<td>C - Provide use requirements through alternative sources</td>
<td>C1 - Use employer, insurance or workforce safety programs for non-compliance of belt use policies</td>
<td>Moderate</td>
<td>Tried</td>
<td></td>
<td>Completed: X</td>
</tr>
</tbody>
</table>
### Speeding/Aggressive Driving Strategies

39% of all severe injuries during 5-year period

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<tr>
<td>A - Heighten driver awareness of aggressive driving/speed-related consequences</td>
<td>A1 - Strengthen speed detection and public perceived risk of being stopped and ticketed through sustained, well-publicized speed enforcement.</td>
<td>High</td>
<td>Proven</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A2 - Explore pilot automated enforcement projects (i.e., speed cameras in work or school zones, red light running cameras), coupled with public outreach about the projects, to assess impact on aggressive driving and public acceptance.</td>
<td>High</td>
<td>Proven</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>B - Improve efficiency and effectiveness of aggressive driving/speed enforcement efforts</td>
<td>B1 - Enact/support legislation to strengthen penalties such as increased fines for right-of-way and speed violations and enhanced penalties for habitual offenders.</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B2 – Review commercial motor vehicle (CMV) Weigh-in-Motion speed data to determine the need for more focused CMV speed enforcement.</td>
<td>Low</td>
<td>Experimental</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>C - Review crash data</td>
<td>C1 - Analyze data to clearly define aggressive driving and identify factors contributing to aggressive driving.</td>
<td>Low</td>
<td>Tried</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>D - Set appropriate speed limits</td>
<td>D1 - Install speed signing using variable message signs in school zones.</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>D2 – Assess and implement speed limits consistent with the analysis of actual sped profiles and supported by the enforcement of limits.</td>
<td>Low</td>
<td>Proven</td>
<td></td>
<td>X</td>
</tr>
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### Speeding/Aggressive Driving Strategies — 39% of all severe injuries during 5-year period

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<tr>
<td>E - Communicate appropriate speeds through use of traffic control devices</td>
<td>E1 - Implement active speed warning signs, including dynamic message boards at rural to urban transitions.</td>
<td>Low</td>
<td>Tried</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>E2 - Use on-pavement measures to communicate the need to reduce speeds.</td>
<td>Moderate</td>
<td>Tried</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>F - Ensure that roadway design and traffic control elements support appropriate and safe speeds</td>
<td>F1 - Effect safe speed transitions through design elements and on approaches to lower speed areas.</td>
<td>High</td>
<td>Tried</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>F2 - Increase signage for no-passing zones.</td>
<td>Low</td>
<td>Tried</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
# Young Drivers Strategies - 18% of all severe injuries during 5-year period

<table>
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<tr>
<td>A - Enhance Graduated Driver Licensing</td>
<td>A1 - Enact enhanced graduated drivers licensing system.</td>
<td>Low</td>
<td>Proven</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A2 – Enact requirement for learner’s permit or supervised driving to be held a minimum of 6 months (or a year).</td>
<td>Low</td>
<td>Proven</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A3 – Extend night driving restriction to include all novice drivers under the age of 18 lasting a minimum of 6 months from date of licensure.</td>
<td>Low</td>
<td>Proven</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A4 - Enact minimum age of 15 (or 16) for learner’s permit.</td>
<td>Low</td>
<td>Tried</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A5 - Require 30 to 50 hours of supervised driving for drivers 16 to 17 years of age.</td>
<td>Low</td>
<td>Proven</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A6 - Implement passenger restrictions for all novice drivers under the age of 18 lasting a minimum of 6 months from date of licensure.</td>
<td>Low</td>
<td>Proven</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A7 - Prohibit cell phone use for drivers under the age of 18.</td>
<td>Low</td>
<td>Tried</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A8 - Implement minimum age of 17 to qualify for a full, unrestricted license.</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>B - Publicize, enforce, and adjudicate laws pertaining to young drivers</td>
<td>B1 - Publicize and enforce teen driving license provisions.</td>
<td>Moderate</td>
<td>Proven</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B2 – Publicize and enforce laws pertaining to underage drinking and driving.</td>
<td>Moderate to High</td>
<td>Proven</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>B3 - Publicize and enforce helmet law for young motorcycle riders under 18.</td>
<td>Low</td>
<td>Proven</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B4 – Enact hands-free cell phone use law to help detect and enforce no-texting/no-web-while driving law.</td>
<td>Low</td>
<td>Tried</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>C - Assist parents in monitoring their teens’ driving</td>
<td>C1 - Require parent education as a driver education classroom component.</td>
<td>Low</td>
<td>Experimental</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>C2 - Publicize technology solutions to promote safe driving behaviors, reduce driver distraction and promote parental engagement.</td>
<td>Moderate</td>
<td>Experimental</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
### Young Drivers Strategies - *18% of all severe injuries during 5-year period*

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Strategies</th>
<th>Relative Cost to Implement and Operate</th>
<th>Effectiveness</th>
<th>Included in 2013 SHSP</th>
<th>Strategy Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>D - Improve young driver training</td>
<td>D1 - Improve content and delivery of driver education/training including vehicle recovery skills training.</td>
<td>Moderate to High</td>
<td>Experimental</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>D2 – Require classroom education for licensure and incorporate educating novice drivers about driving risks.</td>
<td>Low</td>
<td>Tried</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
APPENDIX C

Emphasis Area
Crash Facts Sheets
On North Dakota roadways, there were 1581 severe crashes resulting in 1906 severe injuries between 2012 and 2016 in which the crash involved a vehicle that departed the travel lane or the roadway. This is an average of 381 severe injuries per year and accounted for nearly 58% of all severe injuries during the five year period.

### Driver Demographics

- A total of 2077 drivers were involved in these 1581 crashes.

<table>
<thead>
<tr>
<th>Age</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 19</td>
<td>94 (5%)</td>
<td>131 (6%)</td>
<td>225 (11%)</td>
</tr>
<tr>
<td>20-29</td>
<td>128 (6%)</td>
<td>450 (22%)</td>
<td>578 (28%)</td>
</tr>
<tr>
<td>30-39</td>
<td>70 (3%)</td>
<td>223 (16%)</td>
<td>393 (19%)</td>
</tr>
<tr>
<td>40-49</td>
<td>64 (3%)</td>
<td>283 (14%)</td>
<td>348 (17%)</td>
</tr>
<tr>
<td>50-59</td>
<td>59 (3%)</td>
<td>255 (12%)</td>
<td>314 (15%)</td>
</tr>
<tr>
<td>≥ 60</td>
<td>54 (3%)</td>
<td>163 (8%)</td>
<td>217 (10%)</td>
</tr>
</tbody>
</table>

Note: Totals may not sum to 100% due to drivers of unknown age and/or sex.

### Contributing Factors

- Officers reported a total of 2106 contributing factors in these crashes, among which Speed appears most often.

- Alcohol or drugs were involved in 41% (784) of these severe injuries and 40% (637) of these severe crashes.
- 15% (290) of these severe injuries, occurring among 15% (242) of these crashes, are intersection related.

### Crash Details

- 75% of these lane departure severe injuries are Single Vehicle type and 26% occurred on a curve.

### Seasonal Factors

- Across all seasons, nighttime (6:00 PM - 2:59 AM) account for 45% (724) of these severe injuries.

### Location

- The setting of these severe injuries is primarily Rural (85%) and a majority occurred on the Local (51%) system.

- The majority of these severe injuries occur in oil Counties (51%).
- The top 5 counties represent 40% of these severe injuries: Williams (12%), McKenzie (10%), Ward (7%), Cass (6%), and Burleigh (5%).
On North Dakota roadways, there were 805 severe crashes resulting in 953 severe injuries between 2012 and 2016 in which the crash occurred at or in relation to an intersection. This is an average of 191 severe injuries per year and accounted for nearly 29% of all severe injuries during the five year period.

### Driver Demographics

- A total of 1540 drivers were involved in these 805 crashes.

<table>
<thead>
<tr>
<th>Age</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤19</td>
<td>69 (4%)</td>
<td>88 (6%)</td>
<td>157 (10%)</td>
</tr>
<tr>
<td>20-29</td>
<td>115 (7%)</td>
<td>265 (17%)</td>
<td>380 (25%)</td>
</tr>
<tr>
<td>30-39</td>
<td>70 (5%)</td>
<td>178 (12%)</td>
<td>248 (16%)</td>
</tr>
<tr>
<td>40-49</td>
<td>69 (4%)</td>
<td>201 (13%)</td>
<td>270 (18%)</td>
</tr>
<tr>
<td>50-59</td>
<td>70 (5%)</td>
<td>176 (11%)</td>
<td>246 (16%)</td>
</tr>
<tr>
<td>≥60</td>
<td>76 (5%)</td>
<td>162 (11%)</td>
<td>238 (15%)</td>
</tr>
</tbody>
</table>

Note: Totals may not sum to 100% due to drivers of unknown age and/or sex.

### Contributing Factors

- Officers reported a total of 1055 contributing factors in these crashes, among which Failed to Yield appears most often.

#### Crash Details

- The traffic control devices at these intersections were Stop/Yield (215, 23%) and Signalized (171, 18%). No traffic control was reported for 518 (54%) of these severe injuries.

#### Most Harmful Event for Single Vehicle Collision Type

<table>
<thead>
<tr>
<th>Type</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
<th>Winter</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overturn / Rollover</td>
<td>81 (40%)</td>
<td>30 (15%)</td>
<td>23 (11%)</td>
<td>39 (19%)</td>
<td>173 (18%)</td>
</tr>
<tr>
<td>Pedalcycle</td>
<td>12 (6%)</td>
<td>24 (12%)</td>
<td>23 (12%)</td>
<td>23 (12%)</td>
<td>62 (6%)</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>7 (4%)</td>
<td>17 (9%)</td>
<td>17 (9%)</td>
<td>17 (9%)</td>
<td>59 (6%)</td>
</tr>
<tr>
<td>Fixed Object</td>
<td>18 (9%)</td>
<td>13 (7%)</td>
<td>13 (7%)</td>
<td>13 (7%)</td>
<td>47 (5%)</td>
</tr>
<tr>
<td>Other / Unknown</td>
<td>39 (20%)</td>
<td>13 (7%)</td>
<td>13 (7%)</td>
<td>13 (7%)</td>
<td>69 (7%)</td>
</tr>
</tbody>
</table>

- Alcohol or drugs were involved in 24% (228) of these severe injuries and 23% (182) of these severe crashes.

#### Seasonal Factors

<table>
<thead>
<tr>
<th>Season</th>
<th>12:00-2:59 AM</th>
<th>3:00-5:59 AM</th>
<th>6:00-8:59 AM</th>
<th>9:00-11:59 AM</th>
<th>12:00-2:59 PM</th>
<th>3:00-5:59 PM</th>
<th>6:00-8:59 PM</th>
<th>9:00-11:59 PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>8 (11%)</td>
<td>8 (11%)</td>
<td>23 (28%)</td>
<td>18 (22%)</td>
<td>28 (37%)</td>
<td>18 (23%)</td>
<td>31 (39%)</td>
<td>18 (22%)</td>
</tr>
<tr>
<td>Summer</td>
<td>24 (32%)</td>
<td>19 (25%)</td>
<td>28 (35%)</td>
<td>35 (42%)</td>
<td>35 (45%)</td>
<td>34 (42%)</td>
<td>34 (42%)</td>
<td>37 (44%)</td>
</tr>
<tr>
<td>Fall</td>
<td>31 (39%)</td>
<td>31 (39%)</td>
<td>51 (57%)</td>
<td>17 (20%)</td>
<td>40 (48%)</td>
<td>50 (57%)</td>
<td>51 (57%)</td>
<td>35 (41%)</td>
</tr>
<tr>
<td>Winter</td>
<td>7 (9%)</td>
<td>7 (9%)</td>
<td>25 (31%)</td>
<td>20 (24%)</td>
<td>44 (54%)</td>
<td>35 (41%)</td>
<td>24 (29%)</td>
<td>9 (11%)</td>
</tr>
<tr>
<td>Total</td>
<td>70 (7%)</td>
<td>70 (7%)</td>
<td>123 (13%)</td>
<td>90 (9%)</td>
<td>185 (19%)</td>
<td>199 (22%)</td>
<td>140 (15%)</td>
<td>99 (11%)</td>
</tr>
</tbody>
</table>

- Across all seasons, nighttime (6:00 PM - 2:59 AM) account for 45% (724) of these severe injuries.

- Most of these severe injuries occurred under Dry (80%), Daylight (62%) conditions.

#### Location

- The setting of these severe injuries is primarily Rural (59%) and a majority occurred on the Local (58%) system.

<table>
<thead>
<tr>
<th>Location</th>
<th>Rural</th>
<th>Urban</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>340 (36%)</td>
<td>63 (7%)</td>
<td>403 (42%)</td>
</tr>
<tr>
<td>Local</td>
<td>224 (24%)</td>
<td>326 (34%)</td>
<td>550 (58%)</td>
</tr>
<tr>
<td>Total</td>
<td>564 (59%)</td>
<td>389 (41%)</td>
<td>953 (100%)</td>
</tr>
</tbody>
</table>

- The majority of these severe injuries occur in Non-Oil Counties (52%).
- The top 5 counties represent 56% of these severe injuries: Williams (14%), Cass (12%), Ward (12%), Burleigh (9%), and McKenzie (9%).

- 52% of severe crashes occur on Rural Routes.
- 32% of severe crashes occur on Local Routes.
- 16% of severe crashes occur on Other (36 Counties).

- 764 (80%) of severe crashes occur under Dry conditions.
- 100 (10%) of severe crashes occur under Snow/Ice conditions.
- 81 (8%) of severe crashes occur under Wet conditions.
- 8 (1%) of severe crashes occur under Gravel/Dirt conditions.
- 0 (0%) of severe crashes occur under Unknown conditions.

#### Lighting Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Daylight</th>
<th>Dark (Not Lighted)</th>
<th>Dark (Lighted)</th>
<th>Dawn/Dusk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>592 (62%)</td>
<td>170 (18%)</td>
<td>114 (12%)</td>
<td>75 (8%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>2 (0%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
On North Dakota roadways, there were 886 severe crashes resulting in 1091 severe injuries between 2012 and 2016 in which the crash involved alcohol or drugs. This is an average of 218 severe injuries per year and accounted for nearly 33% of all severe injuries during the five year period.

### Driver Demographics

- A total of 1209 drivers were involved in these 886 crashes, of which 903 drivers had been using drugs or alcohol.

<table>
<thead>
<tr>
<th>Age</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤19</td>
<td>25 (3%)</td>
<td>45 (5%)</td>
<td>70 (8%)</td>
</tr>
<tr>
<td>20-29</td>
<td>55 (6%)</td>
<td>271 (30%)</td>
<td>326 (36%)</td>
</tr>
<tr>
<td>30-39</td>
<td>34 (4%)</td>
<td>167 (18%)</td>
<td>201 (22%)</td>
</tr>
<tr>
<td>40-49</td>
<td>25 (3%)</td>
<td>124 (14%)</td>
<td>150 (17%)</td>
</tr>
<tr>
<td>≥60</td>
<td>5 (1%)</td>
<td>32 (4%)</td>
<td>37 (4%)</td>
</tr>
</tbody>
</table>

Note: Totals may not sum to 100% due to drivers of unknown age and/or sex.

### Contributing Factors

- Officers reported a total of 1167 contributing factors in these crashes, among which Speed appears most often.

<table>
<thead>
<tr>
<th>Contributing Factor</th>
<th>Count of Contributing Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal in Roadway</td>
<td>6 (0%)</td>
</tr>
<tr>
<td>Vision Obstructed</td>
<td>7 (1%)</td>
</tr>
<tr>
<td>Mechanical Failure</td>
<td>9 (1%)</td>
</tr>
<tr>
<td>Improper Overtaking</td>
<td>11 (1%)</td>
</tr>
<tr>
<td>Following Too Close</td>
<td>16 (1%)</td>
</tr>
<tr>
<td>Rain Red Light</td>
<td>19 (2%)</td>
</tr>
<tr>
<td>Improper Turn</td>
<td>21 (2%)</td>
</tr>
<tr>
<td>Weather</td>
<td>29 (2%)</td>
</tr>
<tr>
<td>Attention Distracted</td>
<td>30 (3%)</td>
</tr>
<tr>
<td>Damaged Traffic Signs/Markings</td>
<td>31 (3%)</td>
</tr>
<tr>
<td>Failed to Yield</td>
<td>48 (4%)</td>
</tr>
<tr>
<td>Drove Left of Center</td>
<td>72 (6%)</td>
</tr>
<tr>
<td>Too Fast for Conditions</td>
<td>78 (6%)</td>
</tr>
<tr>
<td>Improper Evasive Action</td>
<td>85 (7%)</td>
</tr>
<tr>
<td>Over-Correcting/Over-Steering</td>
<td>104 (8%)</td>
</tr>
<tr>
<td>Failed to Keep in Proper Lane</td>
<td>131 (11%)</td>
</tr>
<tr>
<td>Errors/Reckless/Aggressive Driving</td>
<td>187 (15%)</td>
</tr>
</tbody>
</table>

### Location

- The setting of these severe injuries is primarily Rural (82%) and a majority occurred on the Local (56%) system.

<table>
<thead>
<tr>
<th>Location</th>
<th>Rural</th>
<th>Urban</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>455 (42%)</td>
<td>26 (2%)</td>
<td>481 (44%)</td>
</tr>
<tr>
<td>Local</td>
<td>438 (40%)</td>
<td>172 (16%)</td>
<td>610 (56%)</td>
</tr>
<tr>
<td>Total</td>
<td>893 (82%)</td>
<td>198 (18%)</td>
<td>1091 (100%)</td>
</tr>
</tbody>
</table>

- The majority of these severe injuries occur in Oil Counties (52%).
- The top 5 counties represent 45% of these severe injuries: Williams (13%), McKenzie (11%), Ward (8%), Cass (7%), and Burleigh (6%).

### Crash Details

- **Most Harmful Event for Single Vehicle Collision Type**
  - Overturn / Rollover: 376 (61%)
  - Fixed Object: 64 (10%)
  - Pedestrian: 41 (7%)
  - Ditch / Embankment: 27 (4%)
  - Parked Motor Vehicle: 21 (3%)
  - Other / Unknown: 88 (14%)

- Of these severe injuries, 51% involved speeding or aggressive driving, 63% involved an unbelted occupant, and 56% involved single-vehicle lane departure.
- 21% (228) of these severe injuries, occurring among 21% (182) of these crashes, are intersection related.

### Seasonal Factors

- **Across all seasons, nighttime (6:00 PM - 2:59 AM) accounts for 66% (719) of these severe injuries.**
- **Most occurred under Dry (82%), Dark (Not Lighted) (46%) conditions.**

<table>
<thead>
<tr>
<th>Surface Condition</th>
<th>Lighting Condition</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
<th>Winter</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry</td>
<td>Dark (Not Lighted)</td>
<td>59 (5%)</td>
<td>92 (8%)</td>
<td>90 (8%)</td>
<td>32 (3%)</td>
<td>273 (25%)</td>
</tr>
<tr>
<td>Snow/Ice</td>
<td>Daylight</td>
<td>22 (2%)</td>
<td>39 (4%)</td>
<td>19 (2%)</td>
<td>15 (1%)</td>
<td>95 (9%)</td>
</tr>
<tr>
<td>Wet</td>
<td>Dark (Lighted)</td>
<td>18 (2%)</td>
<td>15 (1%)</td>
<td>16 (1%)</td>
<td>10 (1%)</td>
<td>59 (5%)</td>
</tr>
<tr>
<td>Dirt/Gravel</td>
<td>Dawn/Dusk</td>
<td>5 (0%)</td>
<td>13 (1%)</td>
<td>5 (0%)</td>
<td>9 (1%)</td>
<td>32 (3%)</td>
</tr>
<tr>
<td>Other</td>
<td>Unknown</td>
<td>15 (1%)</td>
<td>10 (1%)</td>
<td>22 (2%)</td>
<td>9 (1%)</td>
<td>56 (5%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>33 (3%)</td>
<td>43 (4%)</td>
<td>34 (3%)</td>
<td>20 (2%)</td>
<td>130 (12%)</td>
</tr>
</tbody>
</table>

Prepared by CH2M HILL, Inc.
Unbelted Occupants
North Dakota Strategic Highway Safety Plan Update

Severe (Fatal + Incapacitating) Injuries Involving Unbelted Occupants
March 27, 2018

On North Dakota roadways, there were 1264 severe crashes resulting in 1599 severe injuries between 2012 and 2016 in which the crash involved an unbelted or improperly belted occupant. This is an average of 320 severe injuries per year and accounted for nearly 49% of all severe injuries during the five year period.

Driver Demographics

- A total of 1820 drivers were involved in these 1264 crashes, in which 1793 occupants were unbelted.

<table>
<thead>
<tr>
<th>Age</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤19</td>
<td>143 (7%)</td>
<td>207 (10%)</td>
<td>350 (17%)</td>
</tr>
<tr>
<td>20-29</td>
<td>230 (12%)</td>
<td>326 (17%)</td>
<td>556 (26%)</td>
</tr>
<tr>
<td>30-39</td>
<td>287 (15%)</td>
<td>387 (21%)</td>
<td>674 (31%)</td>
</tr>
<tr>
<td>40-49</td>
<td>236 (13%)</td>
<td>258 (14%)</td>
<td>494 (22%)</td>
</tr>
<tr>
<td>50-59</td>
<td>105 (6%)</td>
<td>172 (9%)</td>
<td>277 (13%)</td>
</tr>
<tr>
<td>≥60</td>
<td>31 (2%)</td>
<td>53 (3%)</td>
<td>84 (4%)</td>
</tr>
</tbody>
</table>

*Note: Totals may not sum to 100% due to drivers of unknown age and/or sex.

Contributing Factors

- Officers reported a total of 1706 contributing factors in these crashes, among which Speed appears most often.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal in roadway (17%, 7%)</td>
<td></td>
</tr>
<tr>
<td>Improper Overtaking (37%, 17%)</td>
<td></td>
</tr>
<tr>
<td>Ran-Red Light (21%, 9%)</td>
<td></td>
</tr>
<tr>
<td>Mechanical Failure (26%, 12%)</td>
<td></td>
</tr>
<tr>
<td>Improper Turn (31%, 14%)</td>
<td></td>
</tr>
<tr>
<td>Following Too Close (20%, 9%)</td>
<td></td>
</tr>
<tr>
<td>Vision Obstructed (40%, 18%)</td>
<td></td>
</tr>
<tr>
<td>Disregard Traffic Signs/Markings (40%, 18%)</td>
<td></td>
</tr>
<tr>
<td>Attention Distracted (85%, 41%)</td>
<td></td>
</tr>
<tr>
<td>Drive Left of Center (85%, 41%)</td>
<td></td>
</tr>
<tr>
<td>Weather (100%, 47%)</td>
<td></td>
</tr>
<tr>
<td>Over-Correcting/Over-Steering (135%, 65%)</td>
<td></td>
</tr>
<tr>
<td>Improper Evasive Action (149%, 72%)</td>
<td></td>
</tr>
<tr>
<td>Too Fast for Conditions (161%, 78%)</td>
<td></td>
</tr>
<tr>
<td>Failed to Keep in Proper Lane (152%, 73%)</td>
<td></td>
</tr>
<tr>
<td>Errors/Reducie/Aggressive Driving (157%, 75%)</td>
<td></td>
</tr>
<tr>
<td>Count of Contributing Factors</td>
<td>0</td>
</tr>
</tbody>
</table>

Location

- The setting of these severe injuries is primarily Rural (84%) and a majority occurred on the Local (51%) system.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Rural</th>
<th>Urban</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>736 (46%)</td>
<td>47 (3%)</td>
<td>783 (49%)</td>
</tr>
<tr>
<td>Local</td>
<td>608 (38%)</td>
<td>208 (13%)</td>
<td>816 (51%)</td>
</tr>
<tr>
<td>Total</td>
<td>1344 (84%)</td>
<td>255 (16%)</td>
<td>1599 (100%)</td>
</tr>
</tbody>
</table>

- The majority of these severe injuries occur in Oil Counties (51%).

- The top 5 counties represent 41% of these severe injuries: Williams (12%), McKenzie (10%), Ward (7%), Burleigh (6%), and Cass (6%).

Crash Details

Collision Type

- Single Vehicle (46%, 685)
- Angle (23%, 342)
- Rear-End (14%, 213)
- Head-On (13%, 184)
- Sideswipe (18%, 281)
- Sideswipe (10%, 146)
- Other (5%, 72)

- Of these severe injuries, 43% involved speeding or aggressive driving, 43% involved alcohol or drugs, and 52% involved single-vehicle lane departure.

- 25% (394) of these severe injuries, occurring among 25% (310) of these crashes, are intersection related.

Seasonal Factors

- Across all seasons, nighttime (6:00 PM - 2:59 AM) account for 45% (724) of these severe injuries.

- Most occurred under Dry (79%), Daylight (52%) conditions.

Prepared by CH2M HILL, Inc.
Speeding or Aggressive Driving
North Dakota Strategic Highway Safety Plan Update

Severe (Fatal + Incapacitating) Injuries Involving Speeding or Aggressive Driving
March 27, 2018

On North Dakota roadways, there were 1071 severe crashes resulting in 1298 severe injuries between 2012 and 2016 in which the crash involved speeding or aggressive driving. This is an average of 260 severe injuries per year and accounted for nearly 39% of all severe injuries during the five year period.

**Driver Demographics**
- A total of 1598 drivers were involved in these 1071 crashes, of which 1093 drivers had been driving aggressively.

<table>
<thead>
<tr>
<th>Age</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤19</td>
<td>57 (5%)</td>
<td>100 (9%)</td>
<td>157 (14%)</td>
</tr>
<tr>
<td>20-29</td>
<td>69 (6%)</td>
<td>321 (29%)</td>
<td>390 (36%)</td>
</tr>
<tr>
<td>30-39</td>
<td>35 (3%)</td>
<td>163 (15%)</td>
<td>199 (18%)</td>
</tr>
<tr>
<td>40-49</td>
<td>47 (4%)</td>
<td>130 (12%)</td>
<td>178 (16%)</td>
</tr>
<tr>
<td>≥60</td>
<td>16 (1%)</td>
<td>92 (8%)</td>
<td>109 (10%)</td>
</tr>
</tbody>
</table>

Note: Totals may not sum to 100% due to drivers of unknown age and/or sex.

**Contributing Factors**
- Officers reported a total of 1923 contributing factors in these crashes, among which Speed appears most often.

**Location**
- The setting of these severe injuries is primarily Rural (80%) and a majority occurred on the Local (53%) system.

<table>
<thead>
<tr>
<th></th>
<th>Rural</th>
<th>Urban</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>570 (44%)</td>
<td>41 (3%)</td>
<td>611 (47%)</td>
</tr>
<tr>
<td>Local</td>
<td>472 (36%)</td>
<td>215 (17%)</td>
<td>687 (53%)</td>
</tr>
<tr>
<td>Total</td>
<td>1042 (80%)</td>
<td>256 (20%)</td>
<td>1298 (100%)</td>
</tr>
</tbody>
</table>

- The majority of these severe injuries occur in Oil Counties (54%).
- The top 5 counties represent 45% of these severe injuries: Williams (12%), McKenzie (12%), Ward (9%), Cass (7%), and Burleigh (6%).

**Crash Details**

**Collision Type**
- Single Vehicle (774, 60%)
- Rear-End (222, 17%)
- Angle (198, 15%)
- Head-On (61, 5%)
- Sideswipe (Same Direction) (19, 1%)
- Sideswipe (Opposite Direction) (18, 1%)
- Other (6, 0%)

**Most Harmful Event for Single Vehicle Collision Type**
- Overturn / Rollover 403 (61%)
- Fixed Object 75 (11%)
- Ditch / Embankment 32 (5%)
- Parked Motor Vehicle 26 (4%)
- Pedestrian 21 (3%)
- Other / Unknown 102 (15%)

- Of these severe injuries, 43% involved alcohol or drugs, 53% involved an unbelted occupant, and 55% involved single-vehicle lane departure.

- 21% (270) of these severe injuries, occurring among 22% (231) of these crashes, are intersection related.

**Seasonal Factors**

<table>
<thead>
<tr>
<th></th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
<th>Winter</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00-2:59 AM</td>
<td>36 (13%)</td>
<td>84 (5%)</td>
<td>61 (5%)</td>
<td>27 (2%)</td>
<td>188 (14%)</td>
</tr>
<tr>
<td>3:00-5:59 AM</td>
<td>20 (2%)</td>
<td>24 (2%)</td>
<td>29 (2%)</td>
<td>9 (1%)</td>
<td>82 (6%)</td>
</tr>
<tr>
<td>6:00-8:59 AM</td>
<td>30 (2%)</td>
<td>28 (2%)</td>
<td>38 (3%)</td>
<td>58 (5%)</td>
<td>154 (12%)</td>
</tr>
<tr>
<td>9:00-11:59 AM</td>
<td>20 (2%)</td>
<td>28 (2%)</td>
<td>22 (2%)</td>
<td>47 (4%)</td>
<td>117 (9%)</td>
</tr>
<tr>
<td>12:00-2:59 PM</td>
<td>36 (3%)</td>
<td>53 (4%)</td>
<td>41 (3%)</td>
<td>45 (3%)</td>
<td>175 (13%)</td>
</tr>
<tr>
<td>3:00-5:59 PM</td>
<td>45 (3%)</td>
<td>79 (6%)</td>
<td>37 (3%)</td>
<td>47 (4%)</td>
<td>208 (16%)</td>
</tr>
<tr>
<td>6:00-8:59 PM</td>
<td>49 (4%)</td>
<td>66 (5%)</td>
<td>56 (4%)</td>
<td>41 (3%)</td>
<td>212 (16%)</td>
</tr>
<tr>
<td>9:00-11:59 PM</td>
<td>33 (3%)</td>
<td>65 (5%)</td>
<td>46 (4%)</td>
<td>20 (2%)</td>
<td>162 (12%)</td>
</tr>
<tr>
<td>Total</td>
<td>269 (21%)</td>
<td>405 (31%)</td>
<td>330 (25%)</td>
<td>294 (23%)</td>
<td>1298 (100%)</td>
</tr>
</tbody>
</table>

- Summer afternoons and nights (12:00 PM - 2:59 AM) account for 25% (325) of these severe injuries.

- Most occurred under Dry (66%), Daylight (51%) conditions.
Severe (Fatal + Incapacitating) Injuries Involving Young Drivers

March 16, 2018

On North Dakota roadways, there were 480 severe crashes resulting in 601 severe injuries between 2012 and 2016 in which the crash involved a driver between the ages of 14 and 20. This is an average of 120 severe injuries per year and accounted for nearly 18% of all severe injuries during the five year period.

Driver Demographics

- A total of 803 drivers were involved in these 480 crashes, of which 516 were between the ages of 14 and 20.

<table>
<thead>
<tr>
<th>Age</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 or 15</td>
<td>38 (7%)</td>
<td>28 (5%)</td>
<td>66 (13%)</td>
</tr>
<tr>
<td>16 or 17</td>
<td>56 (11%)</td>
<td>73 (14%)</td>
<td>129 (25%)</td>
</tr>
<tr>
<td>18, 19 or 20</td>
<td>106 (21%)</td>
<td>215 (42%)</td>
<td>321 (62%)</td>
</tr>
</tbody>
</table>

Note: Totals may not sum to 100% due to drivers of unknown age and/or sex.

Contributing Factors

- Officers reported a total of 639 contributing factors in these crashes, among which Speed appears most often.

<table>
<thead>
<tr>
<th>Contributing Factor</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal in Roadway (4, 0%)</td>
<td>6</td>
</tr>
<tr>
<td>Improper Overtaking (9, 1%)</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical Failure (10, 1%)</td>
<td>6</td>
</tr>
<tr>
<td>Improper Turn (11, 2%)</td>
<td>12</td>
</tr>
<tr>
<td>Ran Red Light (14, 2%)</td>
<td>24</td>
</tr>
<tr>
<td>Disregard Traffic Signs/Markings (15, 2%)</td>
<td>28</td>
</tr>
<tr>
<td>Drunk Left of Center (27, 2%)</td>
<td>55</td>
</tr>
<tr>
<td>Failed to Keep in Proper Lane (34, 3%)</td>
<td>69</td>
</tr>
<tr>
<td>Following Too Close (27, 3%)</td>
<td>54</td>
</tr>
<tr>
<td>Attention Distractions (33, 4%)</td>
<td>66</td>
</tr>
<tr>
<td>Vision Obstructed (32, 4%)</td>
<td>64</td>
</tr>
<tr>
<td>Over-Correcting/Over-Steering (33, 4%)</td>
<td>66</td>
</tr>
<tr>
<td>Weather (36, 4%)</td>
<td>72</td>
</tr>
<tr>
<td>Improper Excessive Action (48, 6%)</td>
<td>96</td>
</tr>
<tr>
<td>Too Fast for Conditions (54, 7%)</td>
<td>108</td>
</tr>
<tr>
<td>Erratic/Reckless/Aggressive Driving (57, 7%)</td>
<td>114</td>
</tr>
<tr>
<td>Failed to Yield (92, 11%)</td>
<td>184</td>
</tr>
<tr>
<td>Speed (125, 15%)</td>
<td>250</td>
</tr>
</tbody>
</table>

Count of Contributing Factors 0 20 40 60 80 100 120 140

Crash Details

- Overturn / Rollover 130 (55%)
- Pedestrian 33 (14%)
- Fixed Object 26 (11%)
- Parked Motor Vehicle 12 (5%)
- Ditch / Embankment 9 (4%)
- Other / Unknown 28 (12%)

Most Harmful Event for Single Vehicle Collision Type

- Alcohol or drugs were involved in 24% (144) of these severe injuries and 23% (109) of these severe crashes.
- 31% (186) of these severe injuries, occurring among 33% (158) of these crashes, are intersection related.

Seasonal Factors

- Summer afternoon and evenings (12:00-11:59 PM) account for 24% (145) of these severe injuries.
- Most occurred under Dry (78%), Daylight (60%) conditions.

Location

- The setting of these severe injuries is primarily Rural (68%) and a majority occurred on the Local (64%) system.

<table>
<thead>
<tr>
<th>Location</th>
<th>Rural</th>
<th>Urban</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>193 (32%)</td>
<td>26 (4%)</td>
<td>219 (36%)</td>
</tr>
<tr>
<td>Local</td>
<td>217 (36%)</td>
<td>165 (27%)</td>
<td>382 (64%)</td>
</tr>
<tr>
<td>Total</td>
<td>410 (68%)</td>
<td>191 (32%)</td>
<td>601 (100%)</td>
</tr>
</tbody>
</table>

- The majority of these severe injuries occur in Non-Oil Counties (55%).
- The top 5 counties represent 47% of these severe injuries: Cass (11%), Williams (11%), Ward (9%), Burleigh (8%), and McKenzie (7%).

Prepared by CH2M HILL, Inc.
Severe (Fatal + Incapacitating) Injuries Involving Older Drivers

March 15, 2018

On North Dakota roadways, there were 317 severe crashes resulting in 381 severe injuries between 2012 and 2016 in which the crash involved a driver over the age of 64. This is an average of 76 severe injuries per year and accounted for nearly 12% of all severe injuries during the five year period.

Driver Demographics
- A total of 616 drivers were involved in these 317 crashes, of which 340 were over the age of 64.

<table>
<thead>
<tr>
<th>Age</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>65-74</td>
<td>48 (14%)</td>
<td>154 (45%)</td>
<td>202 (59%)</td>
</tr>
<tr>
<td>75-84</td>
<td>40 (12%)</td>
<td>60 (18%)</td>
<td>100 (29%)</td>
</tr>
<tr>
<td>≥85</td>
<td>12 (4%)</td>
<td>26 (8%)</td>
<td>38 (11%)</td>
</tr>
</tbody>
</table>

Note: Totals may not sum to 100% due to drivers of unknown age and/or sex.

Contributing Factors
- Officers reported a total of 407 contributing factors in these crashes, among which Failed to Yield appears most often.

Collision Type
- Overturn / Rollover 32 (36%)
- Pedalcycle 14 (16%)
- Fixed Object 14 (16%)
- Pedestrian 5 (6%)  
- Parked Motor Vehicle 4 (4%)
- Other / Unknown 21 (23%)

Alcohol or drugs were involved in 8% (30) of these severe injuries and 9% (29) of these severe crashes.

Most Harmful Event for Single Vehicle Collision Type
- Overturn / Rollover 32 (36%)
- Pedalcycle 14 (16%)
- Fixed Object 14 (16%)
- Pedestrian 5 (6%)
- Parked Motor Vehicle 4 (4%)
- Other / Unknown 21 (23%)

- Alcohol or drugs were involved in 8% (30) of these severe injuries and 9% (29) of these severe crashes.
- 48% (184) of these severe injuries, occurring among 49% (155) of these crashes, are intersection related.

Seasonal Factors

<table>
<thead>
<tr>
<th>Location</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
<th>Winter</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>182 (48%)</td>
<td>21 (6%)</td>
<td>203 (53%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>80 (21%)</td>
<td>98 (26%)</td>
<td>178 (47%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>262 (69%)</td>
<td>119 (31%)</td>
<td>381 (100%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Across all seasons, midday (9:00 AM - 5:59 PM) accounts for 71% (270) of these severe injuries.
- Most occurred under Dry (77%), Daylight (81%) conditions.

Surface Condition
- Dry 292 (77%)
- Snow/Ice 53 (14%)
- Wet 33 (9%)
- Dirt/Gravel 3 (1%)
- Other 0 (0%)

Lighting Condition
- Daylight 308 (81%)
- Dark (Not Lighted) 38 (10%)
- Dark (Lighted) 19 (5%)
- Dawn/Dusk 16 (4%)
- Unknown 0 (0%)

The top 5 counties represent 43% of these severe injuries: Ward (10%), Burleigh (10%), Cass (10%), Williams (7%), and Grand Forks (6%).

Non-Oil (36 Counties, 243)
Top Oil (10 Counties, 73)
Other Oil (7 Countires, 65)

Prepared by CH2M HILL, Inc.
## 2012-2016 COUNTY FATALITIES

<table>
<thead>
<tr>
<th>County</th>
<th>Fatalities</th>
<th>County</th>
<th>Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adams</td>
<td>2</td>
<td>McLean</td>
<td>19</td>
</tr>
<tr>
<td>Barnes</td>
<td>17</td>
<td>Mercer</td>
<td>8</td>
</tr>
<tr>
<td>Benson</td>
<td>15</td>
<td>Morton</td>
<td>24</td>
</tr>
<tr>
<td>Billings</td>
<td>4</td>
<td>Mountrail</td>
<td>29</td>
</tr>
<tr>
<td>Bottineau</td>
<td>9</td>
<td>Nelson</td>
<td>10</td>
</tr>
<tr>
<td>Bowman</td>
<td>3</td>
<td>Oliver</td>
<td>2</td>
</tr>
<tr>
<td>Burke</td>
<td>8</td>
<td>Pembina</td>
<td>7</td>
</tr>
<tr>
<td>Burleigh</td>
<td>29</td>
<td>Pierce</td>
<td>12</td>
</tr>
<tr>
<td>Cass</td>
<td>26</td>
<td>Ramsey</td>
<td>11</td>
</tr>
<tr>
<td>Cavalier</td>
<td>7</td>
<td>Ransom</td>
<td>6</td>
</tr>
<tr>
<td>Dickey</td>
<td>4</td>
<td>Renville</td>
<td>3</td>
</tr>
<tr>
<td>Divide</td>
<td>6</td>
<td>Richland</td>
<td>11</td>
</tr>
<tr>
<td>Dunn</td>
<td>16</td>
<td>Rolette</td>
<td>18</td>
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<tr>
<td>Eddy</td>
<td>3</td>
<td>Sargent</td>
<td>3</td>
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<tr>
<td>Emmons</td>
<td>6</td>
<td>Sheridan</td>
<td>1</td>
</tr>
<tr>
<td>Foster</td>
<td>0</td>
<td>Sioux</td>
<td>9</td>
</tr>
<tr>
<td>Golden Valley</td>
<td>3</td>
<td>Slope</td>
<td>4</td>
</tr>
<tr>
<td>Grand Forks</td>
<td>20</td>
<td>Stark</td>
<td>28</td>
</tr>
<tr>
<td>Grant</td>
<td>4</td>
<td>Steele</td>
<td>1</td>
</tr>
<tr>
<td>Griggs</td>
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<td>Stutsman</td>
<td>28</td>
</tr>
<tr>
<td>Hettinger</td>
<td>1</td>
<td>Towner</td>
<td>3</td>
</tr>
<tr>
<td>Kidder</td>
<td>5</td>
<td>Traill</td>
<td>11</td>
</tr>
<tr>
<td>LaMoure</td>
<td>5</td>
<td>Walsh</td>
<td>12</td>
</tr>
<tr>
<td>Logan</td>
<td>0</td>
<td>Ward</td>
<td>52</td>
</tr>
<tr>
<td>McHenry</td>
<td>11</td>
<td>Wells</td>
<td>2</td>
</tr>
<tr>
<td>McIntosh</td>
<td>1</td>
<td>Williams</td>
<td>83</td>
</tr>
<tr>
<td>McKenzie</td>
<td>92</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL** 697