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Regional Implementation of Tribal Transportation Safety Program:
Sisseton Wahpeton Oyate Roadway Safety Improvement Program

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Regional Implementation of Tribal Transportation Safety Program: Sisseton Wahpeton Oyate Roadway Safety Improvement Program

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Disclaimer

ABSTRACT

Tribal communities recognize the need to improve roadway safety. A five-step methodology has been developed by the Wyoming Technology Transfer Center (WYT^2/LTAP) to improve roadway safety on reservations. This methodology was initially implemented on the Wind River Indian Reservation (WRIR), which led to the Wyoming Department of Transportation's funding of three system-wide, low-cost safety improvement projects. Due to the success of the program on the WRIR, tribes across the country have become interested in implementing the program. WYT^2/LTAP and the Northern Plains Tribal Technical Assistance Program (NPTTAP) are helping tribes implement this program on their reservations in the Great Plains region, and have developed criteria to identify tribes for participation.

Reservations in North Dakota and South Dakota applied to TTAP to participate and three tribes were accepted for implementation: the Standing Rock Sioux Tribe (SRST), the Sisseton Wahpeton Oyate Tribe, and the Yankton Sioux Tribe. This study describes the implementation on Sisseton Wahpeton Oyate (SWO).

Many challenges and differences were identified through the analysis, demonstrating that a single procedure would not work for different reservations. Through extensive coordination and collaboration with the tribes and government agencies, WYT^2/LTAP, along with the TTAP centers, can provide the technical assistance the tribes need to develop their own road safety improvement program.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

The Native American community has suffered greatly over the years with higher fatality rates on their reservation roadways than the general U.S. population (National Center for Statistics & Analysis, 2004). State and national tribal transportation safety summits have been held to identify problem areas and develop strategies to reduce fatal and serious injury crashes (Herbel & Kleiner, 2010). In order to address the high fatal and serious injury crashes on reservations, a methodology has been developed by the Wyoming Technology Transfer Center (WYT^2/LTAP) to improve roadway safety. This methodology provides tools for tribes to utilize in prioritizing safety improvements on their reservations. It was first implemented on the Wind River Indian Reservation (WRIR) in Wyoming, and three system-wide low-cost safety improvement projects were funded by the Wyoming Department of Transportation in 2013 (Shinstine & Ksaibati, 2013).

WYT^2/LTAP, along with the Northern Plains Tribal Technical Assistance Program (NPTTAP), is assisting tribes to implement this program on their reservations in the Great Plains region. Tribes interested in developing a safety improvement program for their reservation were notified and encouraged to participate in the spring of 2014. Sisseton Wahpeton Oyate Tribe was accepted for implementation.

1.1 Background

A five-step methodology has been developed by WYT^2/LTAP, which identifies high-risk crash locations and provides low-cost safety improvements to address the hazards on Indian reservations. This methodology was first implemented on the WRIR in Wyoming (Shinstine & Ksaibati, 2013).

A combination of data driven, field verification, and trend analysis is utilized. The five-step procedure is as follows:

1. Crash data analysis.
2. Level I field evaluation of roadway conditions.
3. Combined ranking to identify potential high risk locations based on steps 1 and 2.
4. Level II field evaluation to identify countermeasures.
5. Benefit-cost analysis.

Depending on available data, preference by the tribes, and other factors, this process can be altered to meet the tribes' needs, and is intended for low-cost safety improvements. However, other improvements can be identified and presented to the tribes for other funding consideration. Part of this process includes looking at trends in crash data and developing a systemic approach.

Due to the success of the program on the WRIR, tribes across the country have become interested in implementing the program. The NPTTAP, along with WYT^2/LTAP, developed criteria to identify and help interested tribes participate. In order to qualify for the program, a tribe was required to provide at least three years of crash data and be willing to dedicate the resources to the project; and the tribal leadership must be committed to follow through on the implementation of the program. The success of the programs on the WRIR was due to the cooperation and collaboration among the various stakeholders and WRIR members' commitment to improve safety on their roadways (Shinstine & Ksaibati, 2013).

As sovereign nations, tribes face different challenges than other communities to address their transportation and roadway safety needs (Martinez, Migliaccio, Albert, & Holt, 2009). Collaboration, communication, and cooperation are essential among the different jurisdictions responsible for the roadways on tribal lands. Federal, state, county, township, and tribal governments, and the Bureau of Indian Affairs (BIA) are some of the many agencies involved in the decision-making process faced by the tribes.

Tribal communities recognize that crash reporting is inadequate among the many reservations (Herbel & Kleiner, 2010). Crash reports are either incomplete or non-existent. Many factors contribute to this issue. A South Dakota study of reservations in the state determined that approximately 64% of crashes on tribal lands are under-reported (Bailey & Huft, 2008). The study also indicated that the main problems were either the tribal law enforcement's ability to report the crashes or the relationship between the tribes and the state.

The Indian Reservation Road Safety Improvement Program was developed with these challenges in mind. Through implementation, the tribes have the opportunity to address these issues to their satisfaction and realize an effective program for their reservation.

1.2 Objectives

The purpose of this report is to present the results of the implementation of a roadway safety improvement program on the Sisseton Wahpeton Oyate Indian Reservation.

1.3 Report Organization

This report consists of five sections. Chapter 2 discusses the criteria developed for the regional implementation of the Indian Reservation Safety Improvement Program in the Northern Plains region. Chapter 3 lays out the methodology developed for the program. Chapter 4 is a discussion of crash trends identified on the Sisseton Wahpeton Oyate (SWO) reservation. Chapter 5 discusses the results of the implementation of the program on the SWO. Chapter 6 provides conclusions and recommendations to the objectives laid out in this report.

2. REGIONAL IMPLEMENTATION

Due to the success of the safety improvement program implemented on the Wind River Indian Reservation, tribes across the country became interested in implementing their own program. WYT^2/LTAP and the Northern Plains Tribal Technical Assistance Program (NPTTAP) collaborated to develop a regional implementation for the Northern Plains. They developed criteria for the tribes in the region to apply for implementation of a roadway safety improvement program on their reservation.

2.1 Criteria

Coordination efforts between WYT^2/LTAP and NPTTAP resulted in the development of criteria to identify tribes willing and able to participate in the implementation of a road safety program. The following criteria were used to determine a tribe's eligibility to participate:

1. The tribe should be willing to invest the energy necessary to work with WYT^2/LTAP and NPTTAP throughout the process and commit the needed resources. The main resources needed are individuals willing to spend the time to meet with WYT^2/LTAP, provide personnel to assist with field reviews, and provide feedback.
2. Crash data are critical to addressing safety improvements. The interested reservation needs to have the ability to provide at least three years of crash data and provide WYT^2/LTAP and NPTTAP access to that data. WYT^2/LTAP can work with limited crash data, but needs enough to determine problem areas and trends.
3. Collaboration is key to the success of this program. The tribe needs to have the ability to work with the state DOT, law enforcement (state, county and tribal), reservation road and transportation office or designated tribal member able to make decisions on behalf of the tribe concerning roadway matters.
4. The tribe would need to provide information about any existing strategic plan or initiatives in place to address roadway safety.
5. Most of all, the tribe must have a desire to improve roadway safety on their reservation.

A one-page application was sent to interested tribes addressing these criteria. The completed application, along with a commitment letter from the tribal leadership, was required for a tribe to be considered for implementation.

2.2 Selection

Reservations in North Dakota and South Dakota applied to TTAP to participate. Applications were received from three tribes: the Standing Rock Sioux Tribe (SRST), the Sisseton Wahpeton Oyate Tribe, and the Yankton Sioux Tribe. Initial meetings were held between WYT^2/LTAP and the transportation contact from each to initiate communications and begin the process.

All three tribes are located in South Dakota. However, SRST is located in both North Dakota and South Dakota. This presented an interesting challenge regarding crash data collection and coordination with the state agencies. WYT^2/LTAP met with the respective state offices to determine how their safety programs are managed and who would be responsible for the crash data.

2.3 Sisseton Wahpeton Oyate

Initial meetings established the contacts and processes involved in the SWO's transportation program. Its transportation department consists of a transportation director and a transportation safety officer, along with maintenance and administrative personnel. The transportation safety officer is the contact for this

project. The Sisseton Wahpeton Oyate people reside in northeastern South Dakota within the boundaries of the former Lake Traverse Reservation, with a small portion located in the southeastern corner of North Dakota. The reservation boundaries extend across parts of five counties in South Dakota: Marshall, Day, Codington, Grant, and Roberts. There are 9,894 enrolled members living within the former reservation area, which consists of **1**06,153 acres (without boundaries). Many non-tribal members reside in the area as well. The safety improvement program implementation on SWO is discussed in detail in Chapter 5.

2.4 Chapter Summary

In this chapter, the regional implementation of the Indian Reservation Roadway Safety Improvement Program was discussed. WYT[2]/LTAP and NPTTAP collaborated to develop criteria for tribes in the Northern Plains region to participate. The main criteria require the tribe to have a desire to improve the safety of their roadways with the leadership's willingness to commit to supporting the implementation. Three tribes were selected for participation: the Standing Rock Sioux Tribe, Sisseton Wahpeton Oyate, and Yankton Sioux Tribe. The SWO, located in the northeastern corner of South Dakota, has a land area of about 106,000 acres. They have identified their transportation safety officer as the contact for this project.

3. METHODOLOGY

The methodology developed and previously implemented on the WRIR was used for this project. The methodology allows for flexibility depending on available data, preference by the tribe, and other factors. Part of this process includes looking at trends in crash data and developing a systemic approach. A combination of field data collection, evaluation and trend analysis is utilized. The five-step procedure is as follows:

1. Crash data analysis
2. Level I field evaluation
3. Combined ranking to identify potential high-risk locations based on steps 1 and 2
4. Level II field evaluation to identify countermeasures
5. Benefit-cost analysis

This procedure is shown graphically in Figure 3.1. Crash data are analyzed and a ranking is established based on the high-crash locations. From this ranking, a list of roadways is proposed for field evaluation. From the field evaluation, a ranking of the roadway conditions is developed. The two rankings are combined to provide a list of proposed roadways considered for safety improvements. Another field evaluation is performed to identify safety improvements. Cost estimates are developed and a benefit-cost analysis is performed. The combination of historical crash data and field evaluations provides a substantive basis for identifying high-risk locations. The benefit-cost analysis gives the tribe a measure to prioritize the projects.

Other processes within the methodology are intended to give the tribe the ability to make changes and identify other factors involved in the high-risk locations, such as behavioral factors. These can then be included in their strategic highway safety plan and addressed in other funding requests. A final step in the process is the evaluation of the effectiveness of those improvements. Once projects have been established, funded, and implemented, an after study will need to be performed to determine actual crash reduction resulting from the safety improvement.

This program is intended for low-cost safety improvements, but other improvements can be identified and presented to the tribe to consider for other funding opportunities. The methodology provides flexibility for the tribe to utilize the results the way they consider best to address.

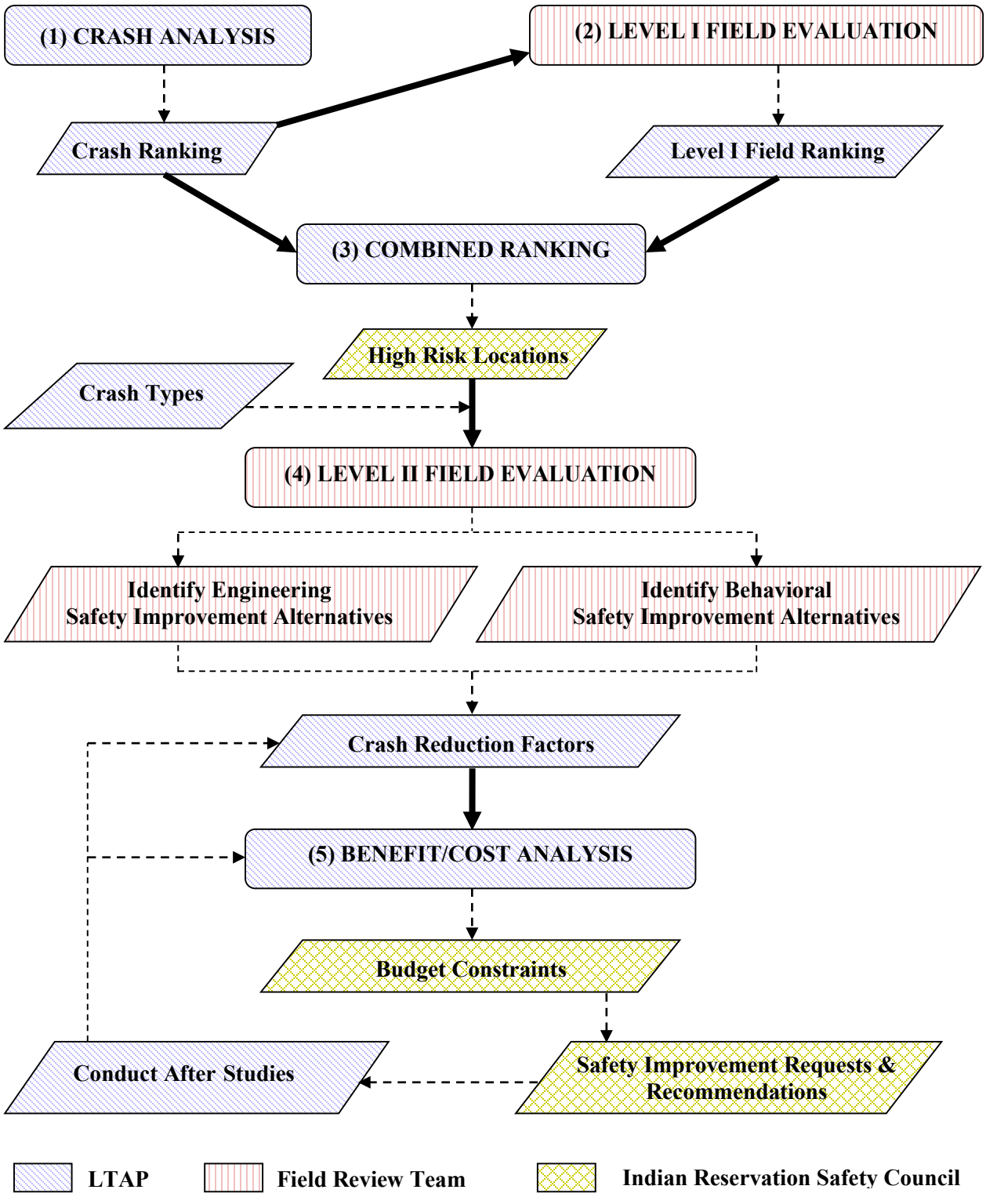

Figure 3.1 Five-Step Process for Indian Reservation Safety Improvement Program

3.1 Crash Data Analysis

The first step in determining high-risk crash locations is the analysis of crash data. All states have some form of crash data analysis capabilities. These data are maintained by either the state DOT, law enforcement, or some other state agency or consultant. An analysis should be done for a recent period of time. Five to 10 years provides enough data to identify trends or hotspots depending on the state and volume of traffic experienced on the local tribal roads. However, as little as three years of data can be used. Typically, they are very low volume because of their rural nature. Crash rates are difficult to quantify because of the lack of traffic data and challenges in maintaining accurate and updated crash data. As discussed previously, tribes often lack complete and accurate crash data.

The crash history obtained will provide the basis for initial ranking of the sites. Based on the number of crashes for a given hotspot, the highest number would receive the highest rank. If traffic volume is available, these crashes can be converted to a crash rate, which provides for a more accurate assessment of high crash occurrence.

Besides the total number of crashes and crash rate, several other factors are analyzed to determine causal effects and severity to identify ways to reduce fatal and serious injury crashes. The following criteria are considered for this analysis:

- Total number of crashes
- Total number of crashes per mile
- Severity of crashes – fatal, injury, or property damage only (PDO)
- Road conditions
- Lighting conditions
- First harmful event
- Driver's gender
- Driver's age
- Alcohol-drug related crashes
- Safety device use
- Speed

The first six criteria above identify physical aspects of the crashes along with the severity. These will provide a basis for determining high-risk locations. Based on direction from the tribes, several factors being analyzed are behavioral in nature. The last five criteria are intended more for the behavioral analysis of the crash data. Behavioral improvements are reviewed along with physical improvements.

The crash analysis includes the number of crashes per one-mile segment, which are known as hotspots. Each segment is ranked from the largest number of crashes per hotspot to the least number of crashes. Based on this ranking, the top high-crash routes are selected and proposed for a Level I field evaluation as the tribes determine.

3.2 Level I Field Evaluation

With the high-crash locations identified, a Level I field evaluation is performed on the selected routes. A team of tribal members and transportation experts, such as LTAP, TTAP and/or the BIA, should perform this evaluation. This team should be selected by the tribes. The tribal personnel are essential in providing the site expertise because they have first-hand knowledge of the problem areas.

The roadways are reviewed at one-mile segments, and each segment is rated from 0 to 10, with 0 being the worst and 10 the best. All segments should begin with a 5 rating as the average. These ratings are applied to five categories as follows:

1. General:
   - Presence of sharp horizontal or vertical curve
   - Visibility
   - Pavement defects that could result in safety problems
   - Ponding or sheet flow areas that could result in safety problems
   - Presence of loose aggregate/gravel that could cause safety problems

2. Intersection and Railroad Crossings:
   - Intersections free of sight restrictions that could result in safety problems
   - Intersections free of abrupt changes in grade or conditions
   - Presence of advanced warning signs when intersection traffic control sight restrictions exist
   - Presence of railroad crossing signs at RR crossing approach
   - Presence of railroad advanced warning signs when crossing sight restrictions exist
   - Vegetation and other obstructions restricting sight distance at railroad crossing
   - Roadway approach grade at railroad crossing level enough to prevent snagging

3. Signage and Pavement Markings:
   - Signing present at needed locations to improve safety
   - Presence of unnecessary signage that may cause a safety problem
   - Effective signage for existing conditions
   - Presence of pavement markings
   - Presence of ineffective pavement markings for present conditions
   - Presence of old or faded pavement markings affecting the safety of the roadway
   - Presence of needed delineators
   - Presence of improper or unsuitable delineators

4. Fixed Objects and Clear Zone:
   - Clear zones free of hazards, non-traversable side slopes without safety barriers
   - Presence of narrow bridges or cattle guards
   - Presence of culverts with inadequate extensions

5. Shoulder and right-of-way:
   - Standard shoulder width
   - Slope greater than 3:1
   - Presence of hazards along shoulder
   - High rollover potential

For a team of evaluators, either discussion could be ensued to determine one score or each member could score independently. Then these scores would be averaged for each segment of each roadway. Maintaining the same team throughout the evaluation period would ensure consistency in results. Each segment receives a total score as the sum of the score for each category. All segments from all evaluated routes are then ranked from lowest to highest score. The lowest score value is considered to have the highest risk. Similar to the crash ranking, a Level I rank is assigned.

3.3 Combined Ranking

The third step in the process is to combine the crash ranking with the Level I ranking. Crash ranking and Level I ranking are tabulated and combined to develop a final ranking for the Level II field evaluation. These rankings are tabulated by road name and/or number, beginning and ending milepost, crash ranking, Level I ranking and, finally, combined ranking. To combine the ranking, the crash ranking and Level I ranking are added.

The segments are then sorted by the combined rank value, smallest to largest. The segments with the smallest numbers are considered the most hazardous. From these segments, the roads with the smallest combined ranking value are considered for Level II field evaluation for determining countermeasures. Although other segments of the same road may have a much lower rank, each road is looked at in its entirety for safety improvements. Ten to 15 roads should be selected for the Level II evaluation.

The rankings, along with the selected roads, are provided to the tribe for their review and approval to proceed with the Level II evaluation. The tribes have the option to include more sites or adjust the rankings based on their insights.

3.4 Level II Field Evaluation

Once the tribe has identified their priority sites, a Level II evaluation is performed on each of the routes selected. This should consist of a team determined by the tribe and should include tribal personnel and transportation experts. Additional data may need to be collected, such as traffic counts and review of behavioral factors, as well as other causal factors to guide decisions on safety improvements. The team reviews each road and revisits the sites as needed to determine the proper countermeasures.

A list of countermeasures is developed for typical applications on rural roadways and crash reduction factors (CRFs) assigned. Information on proven safety countermeasures and CRFs can be obtained from the FHWA Safety website (FHWA, 2008). The FHWA Manual for Selecting Safety Improvements on High Risk Rural Roads (Atkinson, et al., 2014) was developed specifically for identifying appropriate countermeasures. The Crash Modification Factors Clearinghouse (FHWA) is a repository of CMFs that is regularly updated and provides extensive information on the proper applications. Individual states may have developed their own countermeasures and crash reduction factors. Tribal lands in the states they are located typically have similar conditions unique to that area, thus they can utilize those informational resources. Included are behavioral countermeasures the tribes can apply.

Typical countermeasures that are considered low-cost safety improvements include the installation of advanced warning signs, chevrons at curves, delineators, and pavement markings. Others that may require more design and resources would be culvert widening, guardrail installation, and flashing warning beacons. Countermeasures should be applied based on the type of crashes. For run-off-the-road crashes, countermeasures, such as advanced curve warning signs, pavement markings, and chevrons, are effective and low cost.

Each route is evaluated and proposed countermeasures identified. Once all routes have been evaluated and improvements identified, a cost to implement is estimated. This information is used to perform the benefit-cost analysis.

3.5 Benefit-Cost Analysis

Based on the selected countermeasures and associated costs, a benefit-cost analysis is performed for each project. If the project is set up for each road, then all the improvements identified for that road are included in the estimate. This provides the tribe information on the most effective safety improvements. Construction costs are estimated for the safety improvements.

A benefit value associated with each improvement is calculated based on CRFs and societal costs of crashes. The CRF is an estimation of the percent reduction of crashes expected from the implementation of the associated countermeasure. The resources cited in the previous section for identifying countermeasures and crash modification factors should be used to identify the proper CRF for each countermeasure.

This is only an estimate and a general application. Other factors that apply specifically to the site must be considered. The benefit is calculated using the CRF assigned to the particular countermeasure and the cost of that type of crash being avoided. Values for fatal, injury, and PDO crashes are assigned and can be obtained from federal or state sources. When two or more countermeasures are applied to a site, then a weighted combined value is calculated.

The ratio of calculated benefit of the countermeasure to the estimated construction cost is then calculated. Any ratio less than 1.0 should not be considered because the benefit is actually decreased by the countermeasure. In other words, the countermeasure increases the hazard.

Once the benefit-cost analysis is completed for each site, a recommended prioritized list of improvements is provided to the tribe for their review and approval. When the tribe decides what improvements they desire, they can determine what resources they want to allocate to these projects. For the low-cost improvements, the state can provide HSIP funds under the HRRRP.

3.6 Chapter Summary

This chapter lays out the five-step methodology designed to assist tribal governments with developing a safety improvement program. Knowing that tribes have unique challenges and cultural differences, collaboration among their members, government agencies, and other safety stakeholders is essential to successfully implementing such programs. Starting with a review of crash data provides the trends attributed to the crashes, and identification of hotspots is necessary to know where to first look to improve their roadways. A priority ranking is determined based on the high-crash locations.

The top locations are considered for field evaluation, which provides a scoring of the locations based on the roadway conditions. These locations are then ranked from the worst condition to the best. Then the crash rank and the Level I field evaluation rank are combined, providing a new list of priority locations.

The entire road is considered for a Level II evaluation to determine countermeasures for the hotspot locations. Countermeasures are identified and tabulated for each road. Construction cost estimates are calculated for the safety improvement projects determined from the countermeasures. Low-cost improvements include pavement markings, signage, and delineators. Other improvements, such as culvert widening and guardrail installation, should also be considered. The tribes can determine whether to pursue all or part of the proposed improvements.

The benefit of installing each countermeasure is calculated based on CRFs and crash costs. A benefit-cost ratio is then calculated. Projects with large benefit-to-cost ratios should be considered first for implementation. A high benefit-to-cost ratio indicates that for a small investment of funds, there is potential for great reduction in fatal and injury crashes.

4. CRASH ANALYSIS AND TRENDS

In South Dakota, the Department of Public Safety (SDDPS) manages the crash data. The SDDPS claims it receives very little data from tribal and BIA law enforcement for the various tribes around the state. South Dakota publishes its crash data, which contain personal information on individuals involved in the crashes. This presents a problem with many tribes who feel that they do not want such personal information publicized.

Initial analysis has been performed for SWO. South Dakota provided access to the raw crash data for 2004 through 2013, which included information on injury severity, road conditions, lighting conditions, first harmful event (FHE), and FHE location, and personal data that included gender, age, alcohol and drug involvement, safety equipment use, as well as personal data about each individual such as name and address. Because the personal data include information on every person involved in the crash, some simplifications and assumptions were made to link it to a specific crash. Typically, the first person listed in the personal data was the driver. If the crash involved more than one vehicle, only the first driver's information was used.

The crash analysis compared crashes within the reservation boundaries with all state rural roads in the state for a 10-year period (2004-2013). This analysis compared severity, alcohol involvement, driver gender and age, safety equipment use, FHE, and FHE location. Comparisons with other tribes in South Dakota were also made.

4.1 Results

There were 1,065 crashes recorded for SWO from 2004 through 2013. It can be observed in Figure 4.1 that the total number of crashes dropped considerably in 2005 but increased again to 2004 levels by 2010. However, fatal and injury crashes remained fairly consistent. Further study should be done to determine if this is due to better reporting of PDO crashes or if they are in fact increasing.

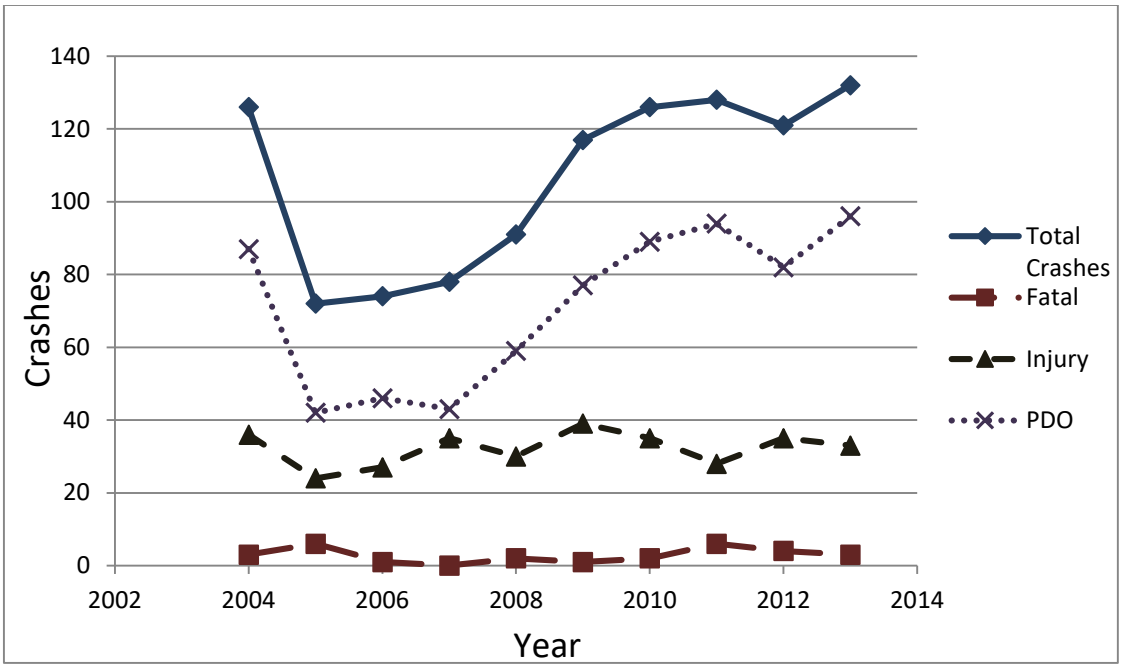

Figure 4.1 SWO Crashes 2004-2013

Crash severity was divided into fatal, injury, and property damage only (PDO). As seen in Figure 4.2, 3% of all crashes on SWO were fatal, compared with 1% for all crashes in South Dakota.

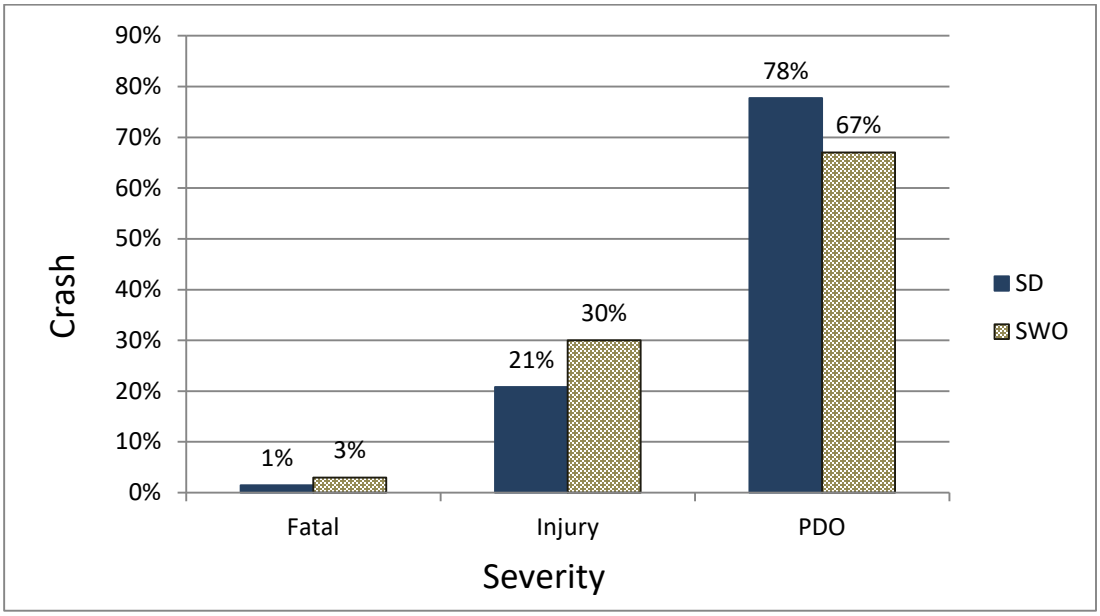

Figure 4.2 Crash Severity in SD and SWO 2004-2013

The FHE revealed that SWO animal crashes were much lower than the state at 22%, compared with 52% of SD crashes. Non-collisions were much higher at 25% compared with 12% for the state. Non-collision crashes included rollover crashes. Motor vehicle and fixed object were also higher. Of all crashes, 1% involved pedestrians. Most of the reservation is rural with long distances between communities. No extensive pedestrian pathways exist to connect these communities, and pedestrians tend to use the rural highways for travel. The FHE results are in Figure 4.3.

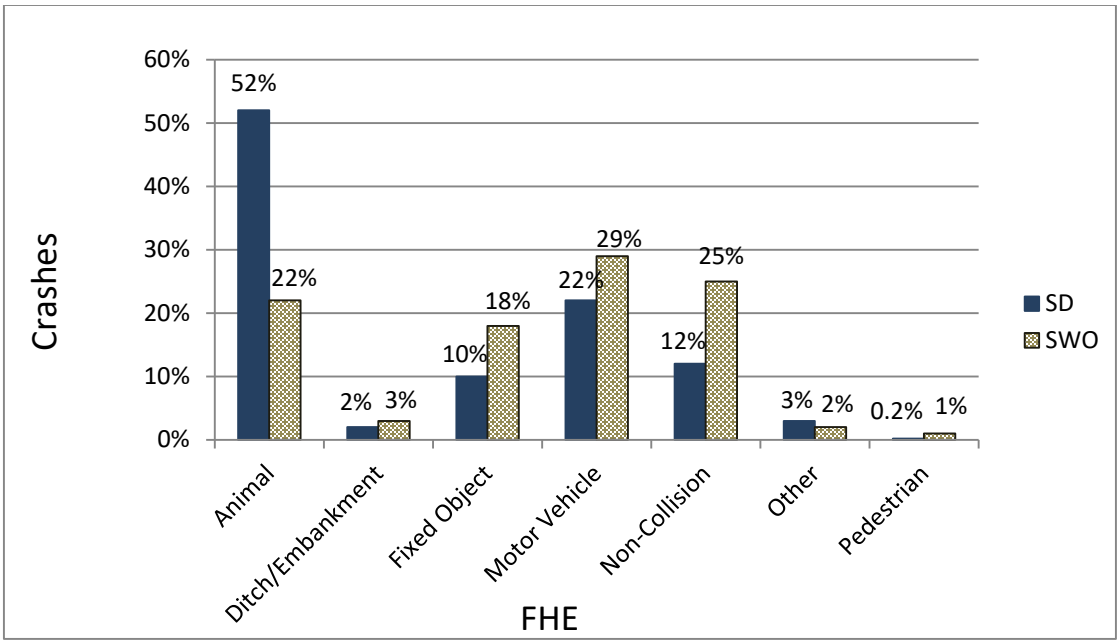

Figure 4.3 First Harmful Event for Crashes in SD and SWO 2004-2013

More off-roadway crashes were reported on SWO than the state at 46% compared with 23%, respectively. With 54% occurring on the roadway, on-road and off-road crashes are of equal concern. See Figure 4.4.

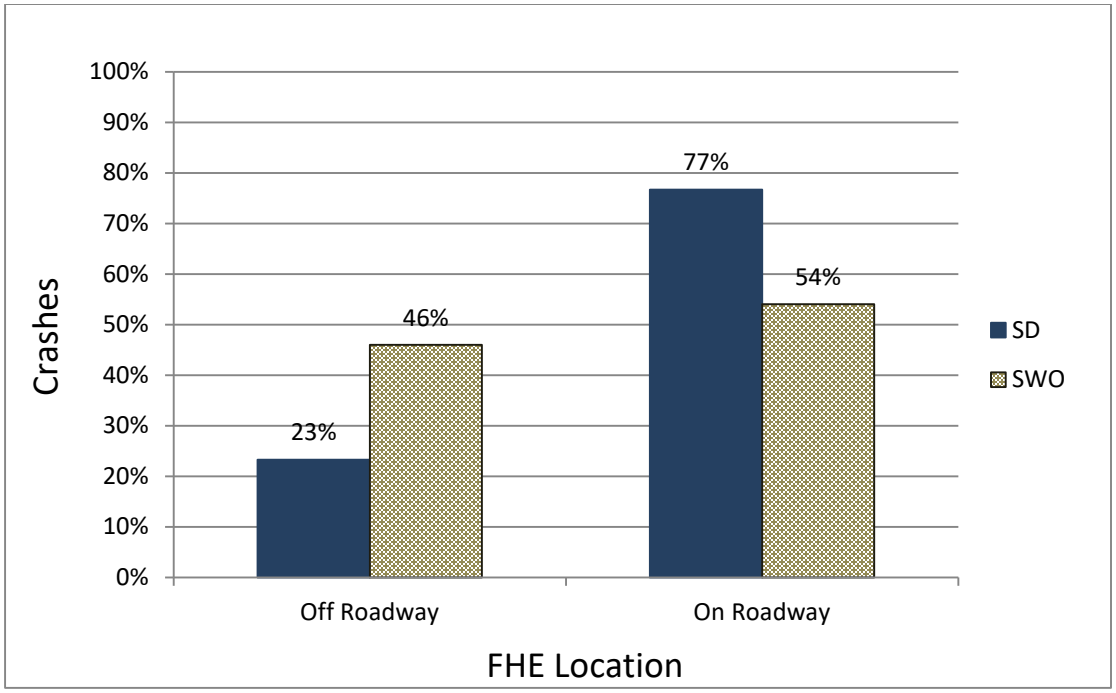

Figure 4.4 FHE Location for SD and SWO 2004-2013

Road conditions were reported as dry for 69% of the crashes, and as ice, snow, frost, or slush for 24%. Wet roads only accounted for 6% of all crashes. See Figure 4.5.

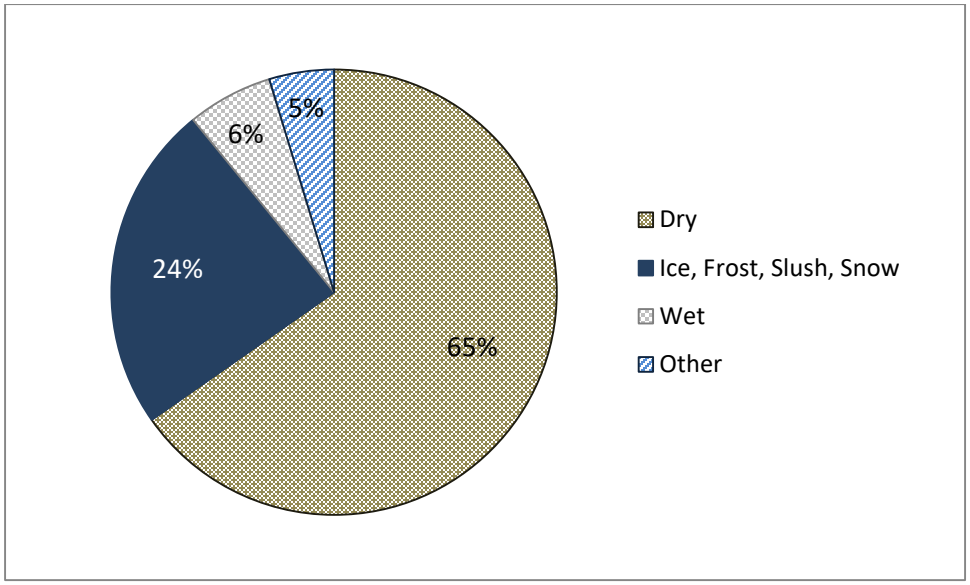

Figure 4.5 SWO Road Conditions 2004-2013

Lighting conditions for the most part showed that crashes were evenly distributed between daylight and dark at 54% and 40%, respectively (Figure 4.6).

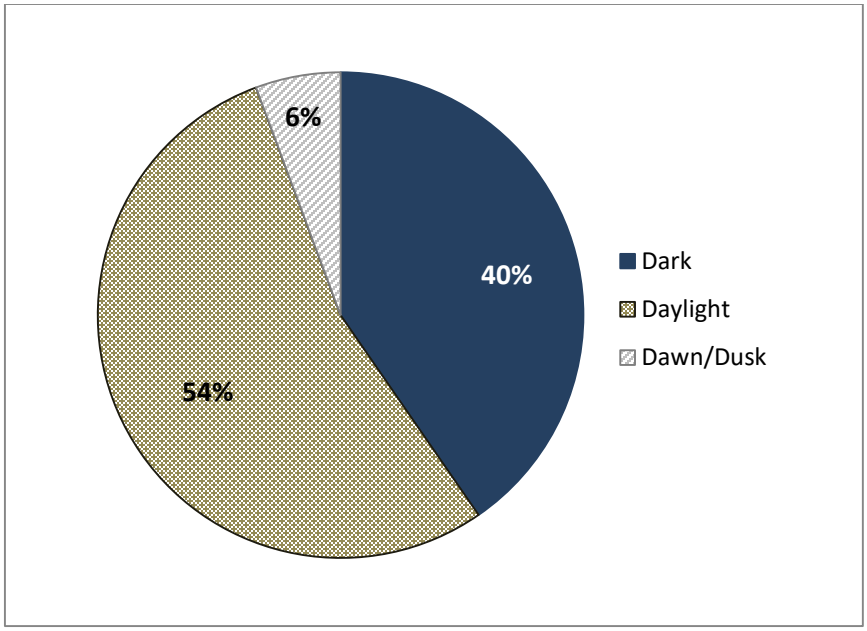

Figure 4.6 SWO Lighting Conditions 2004-2013

More young drivers were involved in crashes on SWO compared with statewide. Of this group, 29% were between the ages of 15 and 24, and 20% were between 25 and 34. Statewide, these values were 21% percent and 17%, respectively. See Figure 4.7.

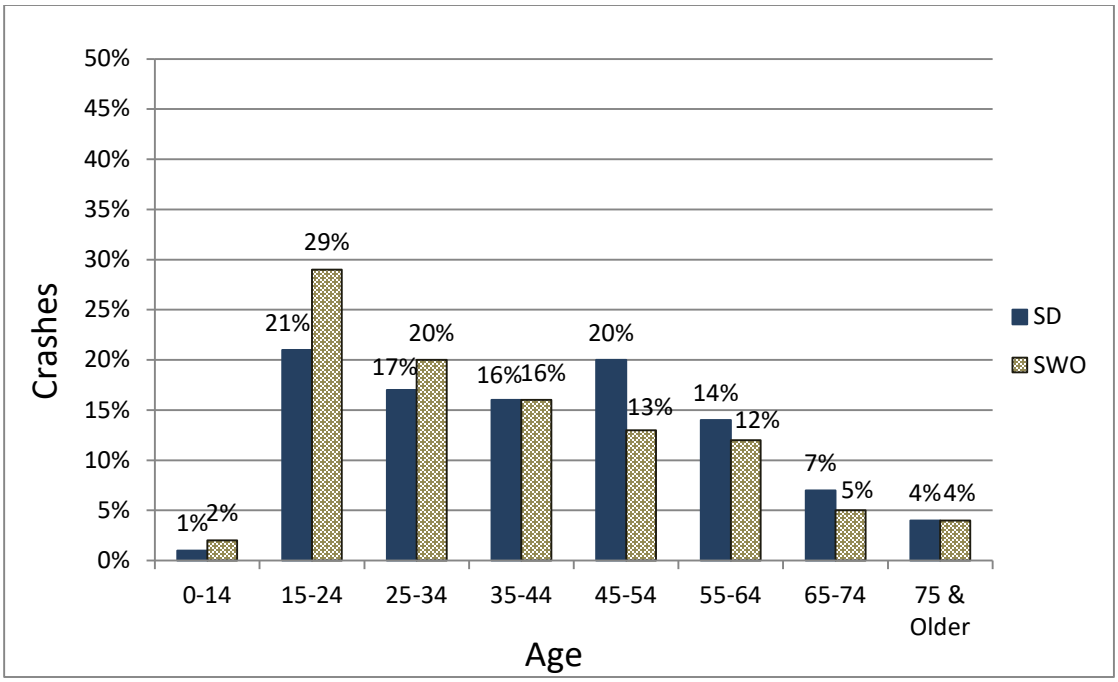

Figure 4.7 Driver Age for SD and SWO 2004-2013

Alcohol was involved in 16% all SWO crashes reported; statewide showed only 4% impaired. However, it should be noted that the statewide also shows 50% as unknown or not reported impairment, as compared with SWO at 22% unreported. See Figure 4.8.

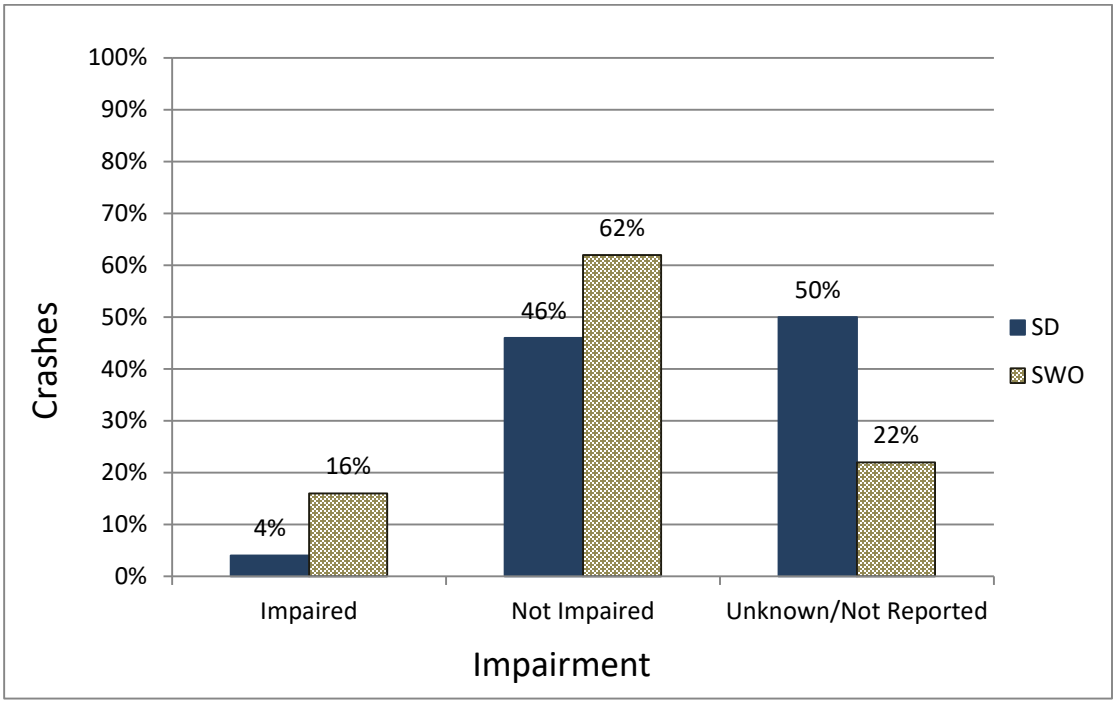

Figure 4.8 Crashes Involving Alcohol in SD and SWO 2004-2013

Safety equipment use is reported as higher on the reservation at 54%, compared with 37% across the state (Figure 4.9). This could account for fewer fatal rollover crashes.

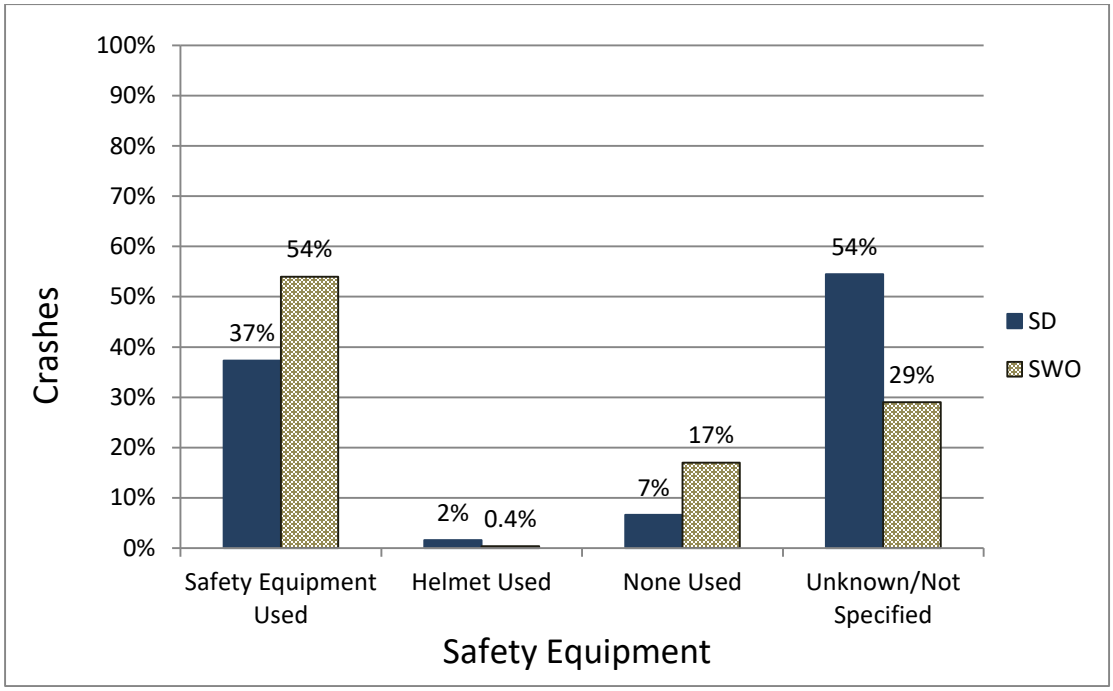

Figure 4.9 Safety Equipment Use in SD and SWO 2004-2013

4.2 Chapter Summary

The crash data for SWO were analyzed and trends were identified. South Dakota DPS provided crash data from 2004 through 2013. There were a total of 1,065 crashes reported between 2004 and 2013. Crashes dropped considerably in 2005, but returned to 2004 levels in 2010. However, fatal and injury crashes remained fairly constant, but PDO crashes increased. This could be due to better reporting of PDO crashes. Of all crashes at SWO, 3% were fatal and 30% were injury. These rates are higher than statewide fatal and injury crashes at 1% and 21%, respectively.

Motor vehicle collisions were the highest first harmful event at 29% of all crashes, followed by non-collision crashes at 25% and other fixed-object crashes at 18%. These are higher than statewide, which are at 22%, 12%, and 10%, respectively. Animal crashes on SWO are much lower than statewide, at 22%, compared with 52% statewide. The non-collision and fixed-object crashes account for most run-off-the-road crashes. SWO has a comparable number of on-road crashes to off-road crashes. Alcohol was involved in 16% of SWO crashes, compared with the statewide average of 4%. SWO had a higher percentage of safety equipment use at 54% of all crashes, compared with the state at 37%. SWO had a higher percentage of young drivers involved in crashes than the state, with 29% between the ages of 15 and 24.

5. SISSETON WAHPETON OYATE IMPLEMENTATION

The Sisseton Wahpeton Oyate people reside in northeastern South Dakota within the boundaries of the former Lake Traverse Reservation, with a small portion located in the southeastern corner of North Dakota. The reservation boundaries extend across parts of five counties in South Dakota: Marshall, Day, Codington, Grant, and Roberts. There are 9,894 enrolled members living within the former reservation area, which consists of 106,153 acres (without boundaries). Many non-tribal members reside in the area as well. They have a transportation department that consists of a transportation director and a transportation safety officer, along with maintenance and administrative personnel. They maintain their BIA roads and share maintenance with the many townships within their boundaries.

5.1 Applied Methodology

The methodology was slightly modified to fit the needs of SWO. A preliminary crash ranking was first performed based on mapped locations. A revised crash ranking was performed once mile post locations were established during the field evaluations. In order to maximize resources, the Level I and Level II evaluations were performed simultaneously. See Figure 5.1.

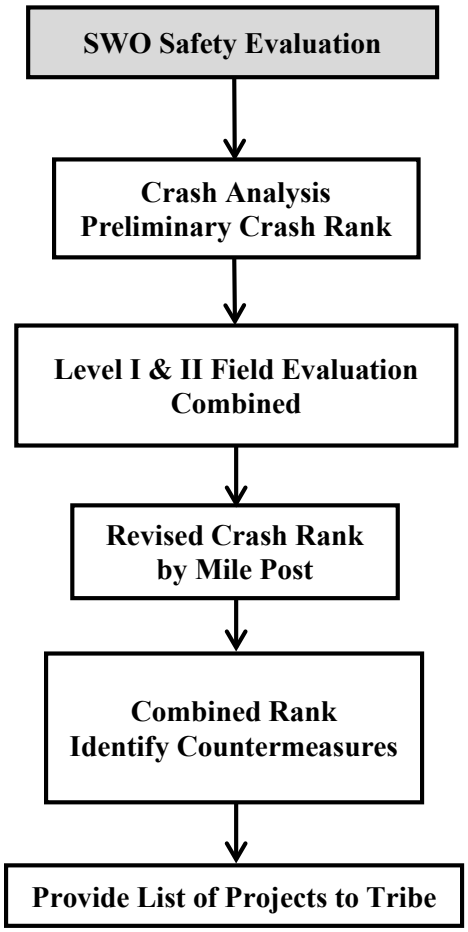

Figure 5.1 Applied Methodology

5.2 Crash Analysis

The analysis of crash data is the first step in roadway safety program methodology. Safety goals and strategies are driven by data that document the safety problems. Many factors must be reviewed to determine appropriate safety measures considering the four E's of safety (engineering, enforcement, education, and emergency response).

The analysis and subsequent ranking proceeded using the crash analysis described in Chapter 3. An initial ranking was performed based on GIS maps with the crashes overlaid on the roadways (Appendix A). Initial data did not include all milepost locations. Once the Level I field evaluation was completed, the crash ranking mileposts were revised to match the Level I mileposts. Table 5.1 is the preliminary crash ranking (See Appendix B for the revised crash ranking). The road segments were then sorted by the highest number of crashes per segment. Ranking was assigned starting at one (1). Progressing through the list, equal scores received equal rank.

Table 5.1 SWO Preliminary Crash Ranking (2004-2013)

Highway	Functional Class	No. Crashes	Length (mi)	Crashes/mi	Crash Rank
446 Ave	Rural Major Collector	9	2	5	1
459 Ave	Rural Major Collector	27	7	3.9	2
473 Ave	Rural Major Collector	3	1	3	3
455 Ave	Rural Major Collector	42	16	2.6	4
456 Ave	Rural Local Road	3	1.5	2.0	5
107 St	Rural Major Collector	6	3	2	6
164 St	Rural Major Collector	5	2.5	2	6
446A Ave	Rural Major Collector	8	4	2	6
465 Ave	Rural Major Collector	4	2	2	6
446 Ave	Rural Major Collector	16	9	1.8	10
122 St	Rural Minor Collector	3	1.7	1.8	10
447 Ave	Rural Major Collector	5	3	2	12
127 St	Rural Major Collector	32	20	1.6	13
118 St	Rural Local Road	6	4	1.5	14
445 Ave	Rural Major Collector	3	2	1.5	14
455 Ave	Rural Major Collector	19	13	1.5	14
144 St	Rural Minor Collector	7	5	1.4	17
BIA 7	Rural Major Collector	17	13	1.3	18
463 Ave	Rural Local Road	5	4	1.3	28
448 Ave	Rural Major Collector	5	4	1.3	18
122 St	Rural Minor Collector	10	10	1	21
149 St	Rural Major Collector	5	5	1	21
454 Ave	Rural Major Collector	13	13	1	21
BIA 3	Rural Major Collector	4	4	1	21
Lohre Rd	Rural Major Collector	4	4	1	21
462 Ave	Rural Major Collector	8	9	0.9	26
473 Ave	Rural Major Collector	6	7	0.9	26
County Rd 10	Rural Major Collector	5	6	0.8	28
142 St	Rural Local Road	4	5	0.8	28
446 Ave	Rural Major Collector	12	15	0.8	28
458 Ave	Rural Minor Collector	11	15	0.7	31
118 St	Rural Local Road	2	3	0.7	31
Lake Rd	Rural Major Collector	7	11	0.6	33
101 St	Rural Minor Collector	16	29	0.6	33
457 Ave	Rural Local Road	5	19	0.3	35

5.3 Level I Field Evaluation

After consultation with the tribe, 21 roads were selected to be evaluated, including BIA 200, which was requested by the tribe for evaluation. The evaluating team consisted of four individuals, SWO transportation safety officer, WYT^2/LTAP, Northern Plains TTAP, and SD LTAP.

Five categories were evaluated: general roadway conditions, intersections, signage and pavement markings, fixed objects and clear zone, and shoulder and right-of-way, as described in Chapter 2. The same criteria used to score the segments for the initial implementation on the Wind River Indian Reservation was used for the SWO. Each category was evaluated separately for each one-mile segment, assigning a score of 0 to 10 for each category. Zero (0) would be the worst condition and 10 would be the best. The starting level is five (5). For each segment, the score is totaled for all six categories providing a final score per segment.

The spreadsheets developed for each roadway for Level I can be observed in Appendix C. This process was repeated for each segment of each roadway selected from the crash ranking. Each roadway ranged from two-miles to 18-miles long. Field decisions were made by SWO team members to reduce the length evaluated based on knowledge of recent or upcoming construction and maintenance that would address safety issues. Looking at the hotspots in the context of the entire roadway is a practical approach to address roadway safety improvements. For example, if the field evaluation reveals that the roadway is in poor condition, pavement markings are missing, or shoulders are narrow, the improvement would not only be applied to the hotspot but to the entire portion of the roadway.

SWO lies within several counties, and more than one name is assigned to the highways. A revised list of roads evaluated was developed to clarify which roads, what sections, and in which direction they were evaluated. These are listed in Table 5.2

Table 5.2 SWO Roads Reviewed During Field Evaluation

Highway	Other Road Names	County	Begin Point	End Point	Beg MP	End MP	Direction Evaluated
101 St	County Rd 25	Roberts	473 Ave	455 Ave	0	18	E - W
118 St	BIA 8	Roberts	455 Ave	459 Ave (SD 127)	0	4	W - E
123 St	County Rd 32	Roberts	459 Ave	454 Ave	0	5	E - W
127 St	County Rd 5	Roberts	449 Ave	465 Ave	0	16	W - E
129 St/128 St	County Rd 4	Day	446 Ave	449 Ave	0	4	W - E
164 St	County Rd 6	Codington	453 Ave	450 Ave	0	3	E - W
445 Ave		Marshall	127 St	BIA 3 (122 St)	0	5.5	S - N
446 Ave (South)	County Rd 19	Day	148 St	US Hwy 12	0	7	S - N
446A/446 Ave	County Rd 19	Day	US Hwy 12	129 St	0	13.3	S - N
447/446 Ave	BIA 15	Marshall	SD Hwy 10	SD Hwy 25	0	15	S - N
453/454 Ave	Lohre Rd	Roberts	US Hwy 12	SD Hwy 10	0	24	S - N
455 Ave (North)	County Rd 30	Roberts	101 St	SD Hwy 10	0	18	N - S
455 Ave (South)	County Rd 30	Roberts	US Hwy 12	158 St	0	16	N - S
456 Ave	Township Rd	Roberts	Goodwill Rd	Nelson Ln	0	4	S - N
459/458 Ave	County Rd 34	Roberts	SD Hwy 10	BIA 200	0	13.4	N - S
462 Ave		Roberts	127 St	136 St (SD 15)	0	9	N - S
473 Ave		Roberts	111 St	101 St	0	10	S - N
475 Ave		Roberts	112 St	110 St	0	2	S - N
BIA 3		Marshall	445 Ave & 122 St	SD Hwy 10	0	5	S - N
BIA 200		Roberts	459 Ave	456 Ave	0	6	E - W
Lake Rd		Roberts	SD Hwy 10	473 Ave & 113 St	0	12	W - E

Once evaluation of all the roads was complete, the segment scores were tabulated. The overall Level I score for each segment was assigned, and the segments were sorted from lowest to highest score. From this, ranking was assigned starting at one (1). Progressing through the list, equal scores received equal rank. The next rank number would be that associated with the total number of segments ranked so far. Table 5.3 summarizes the Level I ranking for the top 55 segments. See Appendix C for a complete list of the Level I Ranks for all 214 segments.

Table 5.3 SWO Level I Rank

Highway	Beg MP	End MP	Level I Score	Level I Rank
456 Ave	1	2	7	1
446 Ave (S)	7	8	10	2
455 Ave (S)	0	1	12	3
455 Ave (S)	11	12	14	4
446 Ave (S)	6	7	16	5
456 Ave	0	1	16	5
456 Ave	2	3	16	5
456 Ave	3	4	16	5
462 Ave	0	1	17	9
459/458 Ave	0	1	18	10
462 Ave	4	5	18	10
123 St	0	1	19	12
123 St	1	2	19	12
123 St	2	3	19	12
123 St	3	4	19	12
123 St	4	5	19	12
446A/446 Ave	0	1	19	12
446A/446 Ave	1	2	19	12
446A/446 Ave	2	3	19	12
446A/446 Ave	3	4	19	12
462 Ave	1	2	19	12
462 Ave	2	3	19	12
462 Ave	3	4	19	12
127 St	12	13	20	24
127 St	13	14	20	24
127 St	14	15	20	24
127 St	15	16	20	24
118 St	2	3	21	28
118 St	3	4	21	28
Lake Rd	4	5	21	28
455 Ave (S)	4	5	22	31
455 Ave (S)	5	6	22	31
455 Ave (S)	7	8	22	31
459/458 Ave	1	2	22	31
Lake Rd	0	1	22	31
Lake Rd	1	2	22	31
Lake Rd	2	3	22	31
Lake Rd	3	4	22	31
Lake Rd	5	6	22	31
Lake Rd	6	7	22	31
Lake Rd	7	8	22	31
Lake Rd	8	9	22	31
Lake Rd	9	10	22	31
Lake Rd	10	11	22	31
Lake Rd	11	12	22	31
118 St	0	1	23	46
118 St	1	2	23	46
164 St	0	1	23	46
164 St	1	2	23	46
164 St	2	3	23	46
455 Ave (S)	6	7	23	46
455 Ave (S)	8	9	23	46
455 Ave (S)	9	10	23	46
455 Ave (S)	10	11	23	46
Lohre Rd	8	9	23	46

5.4 Combining the Crash Ranking and the Level 1 Ranking

With a list of all the segments ranked by highest number of crashes and lowest Level I score, the two rankings were combined. The crash rankings were first re-done to match the one-mile segments to the Level I one-mile segments for each route. Refer to Appendix B for the revised crash rankings. Then the respective ranks for the respective segments were added. Appendix E provides the combined ranking for all roadway segments.

Once these were all totaled, the segments were sorted from smallest to largest combined rank value. The road segments with the lowest score were used to select the roads that would be evaluated for safety improvements. Table 5.4 is a list of the top 13 roads from the combined ranking.

Table 5.4 Combined Rank for Top 13 Roads

Highway	Beg MP	End MP	Combined Rank
118 St	2	3	65
	3	4	45
123 St	0	1	97
	1	2	97
	3	4	49
	4	5	97
127 St	0	1	93
	2	3	93
	3	4	93
	9	10	73
	12	13	61
	15	16	61
164 St	0	1	50
	2	3	55
445 Ave	2	3	93
446 Ave (S)	6	7	9
446A/446 Ave	0	1	13
	1	2	29
	3	4	97
455 Ave (N)	16	17	98
455 Ave (S)	0	1	7
	4	5	68
	5	6	68
	6	7	83
	9	10	47
	10	11	50
	11	12	13
456 Ave	0	1	42
	1	2	86
459/458 Ave	0	1	47
	2	3	90
	4	5	98
	5	6	93
462 Ave	0	1	94
	1	2	97
	2	3	29
Lake Rd	10	11	40

5.5 Level II Field Evaluation – Selection of Countermeasures

As previously explained, Level II field evaluations were performed during the Level I field evaluations. The team discussed countermeasures with the understanding that further investigation would be needed. From the combined rankings, the hotspot locations were reviewed for most severe crashes at those locations, roadway geometrics, and other unique conditions to identify appropriate countermeasures.

Thirteen roads were identified for recommended safety improvements. The countermeasures are identified for the given roadway segments in Table 5.5.

Table 5.5 Level II Field Evaluation and Recommended Countermeasures

Highway	Beg MP	End MP	Most Severe Crash	Road Geometry	Prevalent crashes	Recommended Countermeasure
118 St	1	4	Injury	Level, Gravel	Overturn/ Rollover	Speed Study for compliance and possibly reduced speed
123 St	0	5	Injury	Level, Gravel, 55 MPH	Overturn/ Rollover, Roadside	Speed Study for compliance and possibly reduced speed
127 St	0	16	Injury	Straight & curves, no shoulder	Overturn/ Rollover, Animal, Intersections	Rumble Strip/Stripe, Intersection Ahead Signs at cross streets,
164 St	0	3	Injury	Straight, narrow shoulder	Intersection	Intersection ahead/stop ahead, proper stop signage, transverse Rumble Strip, intersection study
445 Ave	0	6	Fatal	Curves, rough pavement	Roadside	Curve warning signs w/chevrons. Replace right angle curve sign at T-int. Surface treat or overlay
446 Ave (S)	0	7	Fatal	Curves, narrow shoulder	Overturn/ Rollover, Roadside	Rumble stripe, Chevrons in curves
446A/ 446 Ave	0	4	Injury	Curves, entrances	Overturn/ Rollover, Roadside	Speed Study for compliance and possibly reduced speed in high density driveway areas, Chevrons in curves, Rumble Strip/Stripe
455 Ave (N)	5	18	Injury	Straight, No shoulders	Animal, Roadside, collisions	Edgelines, Rumble Strip/Stripe, Safety wedge
455 Ave (S)	0	12	Injury	Straight, No shoulders	Overturn/ Rollover, Roadside, Animal	Replace Guardrail, Remove objects in clear zone, Install intersection ahead signs, Edgelines and centerline
456 Ave	0	2	Fatal	Level, Gravel, rough	Overturn/ Rollover	Increase maintenance, Speed study for possible reduced speed
459/458 Ave	0	9	Fatal*	Straight & curves, no shoulder, good recovery slopes	Overturn/ Rollover, Roadside, Animal	Rumble Strip/Stripe, Safety wedge, Delineators in curve,
462 Ave	0	9	Injury	Straight, No shoulder	Overturn/ Rollover	Edgelines, Rumble Strip/Stripe, Safety wedge
Lake Rd	0	12	Fatal	Curves, narrow shoulders	Overturn/ Rollover, Roadside	Edgelines & Centerline, Clear vegetation in ROW, Replace Guardrail

* Pedestrian Fatality

5.5.1 Gravel Roads

Three roads recommended for improvements are gravel, two of which are local township roads; 118th Street, 123rd Street, and 456th Avenue are level, gravel roads. The prevalent crashes are rollovers. Because the surface becomes rough between maintenance, high speeds could be contributing to these crashes. The speed limit on gravel roads is 55 MPH. A speed study is recommended to determine if operating speeds are in compliance and, if so, a lower speed limit should be considered.

The township roads suffer from lack of maintenance because of the small townships' limited resources. The tribe may want to explore the possibility of partnering with the many townships within their boundaries and pool their resources to be able to provide more consistent maintenance. Other township roads were reviewed, but were not included in the final combined ranked list.

When the team was traveling from 123rd Street to evaluate another road, 124th Street was traveled. This was not on the list of roads to evaluate. However, some discrepancies were noted. This road is very low volume, and vegetation is present within the driving lanes. A road closed sign was lying in the brush on the side of the road. The road ended at water's edge about a mile later (See Figure 5.2). This is potentially dangerous if a driver is unfamiliar with the road or is traveling at night. It is recommended that the road closed sign be re-installed and the proper barricade (MUTCD Type III) be installed at the end of the roadway.

Figure 5.2 124th Street End of Roadway at Water's Edge

5.5.2 Paved Roads

Several paved roads had similar roadway conditions and similar prevalent crash types. Many were straight, narrow roadways with little or no shoulders. Rollovers or roadside hazards are the typical first harmful event. This indicates that most crashes on these roadways are run-off-the-road crashes. Because of the narrow widths, no shoulders, and non-recoverable roadside slopes, speed could be a factor. A longitudinal rumble strip is recommended for these roadways where enough shoulder exists. On roadways that have no shoulder, a rumble stripe could be applied directly to the edgeline. And edgelines should be added to those roads that have no edgeline. Refer to Table 5.5 for specific roadways and countermeasures.

The roads 455th Avenue (north) and 462nd Avenue are narrow with no shoulders. The roadway drops off at the edge of pavement. If a vehicle only slightly departs from the travel lane, the wheel could catch the edge of pavement causing the driver to over-correct to return to the pavement. Adding a safety edge would improve recovery for vehicles in these areas.

Additionally, 455th Avenue (south) is a straight roadway with no shoulders. Within the first half-mile south of US 12, approximately 2,200 feet of cable barrier is located along both sides of the roadway. It appears to be too low, and in some locations is in poor condition. This area should be reviewed to replace the cable barrier, especially near the approaches of a bridge located at MP 0.4.

Many of the roads with curves were properly signed with advanced curve warning signs, including advisory speeds. However, crashes are occurring along the curves. These could be improved by adding chevrons in the curve.

A pedestrian fatality occurred along 459th Avenue. As noted, this road has narrow to no shoulders. There are no pathways connecting the community centers, and many tribal members walk to their destinations. A pedestrian pathway study and plan is recommended for development.

There are no curve warning signs at any curve locations on 445th Avenue. These should be added along with the chevrons. At milepost 5.7, a right-angle curve warning sign is located at a T-intersection. This should be replaced with the proper T-intersection sign. This roadway also has some rough pavement that should be considered for repair with an overlay or surface treatment.

Two winding roadways, 446th Avenue and 446A Avenue, are located along some lake areas on the western side of SWO. Heavy recreational traffic and truck traffic occur along these roads. There are areas with a concentration of driveways and many locations where vehicles park along the roadway to access the adjacent lakes. Rollover crashes, mostly along curves, are prevalent.

The roadways 446th Avenue and 446A Avenue have some shoulder and good pavement markings. A longitudinal rumble strip is recommended. With proper advanced curve warning signs and advisory speeds already in place, chevrons should be added in the curves. A speed study is recommended to determine compliance to existing speed limits and to determine if speed reduction should be posted in high-density driveway areas. Figure 5.3 is a map of the two roadways showing the existing signage and crashes. At the north end of 446th Avenue where it intersects with 129th Street, the T-intersection could be better marked with a larger double arrow sign and an advanced intersection ahead sign.

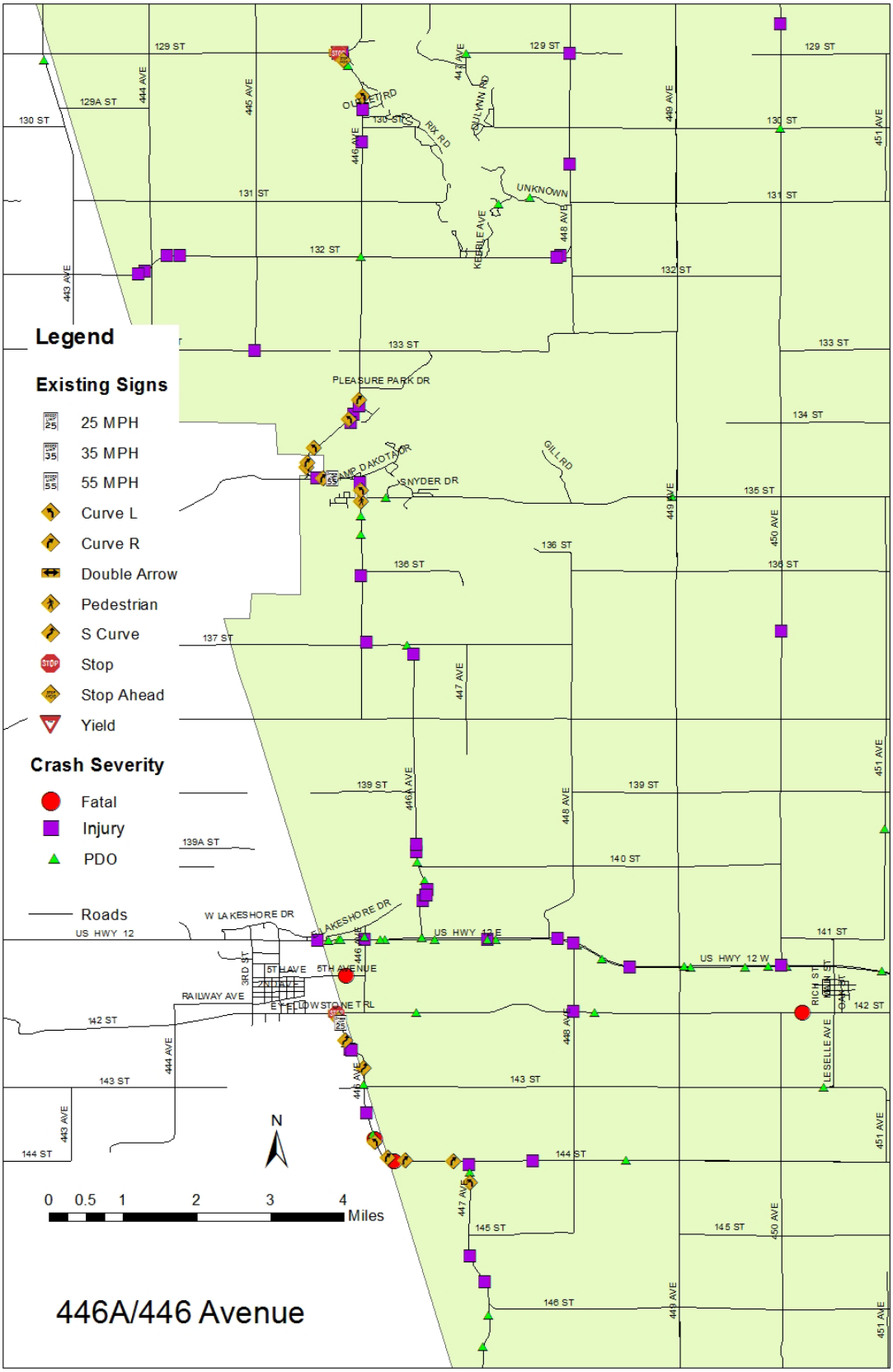

Figure 5.3 Existing Signage and Crashes Along 446th Avenue and 446A Avenue

Lake Road, located at the east side of SWO, is a narrow road with curves and no shoulders. There is vegetation, including trees in the right-of-way and possibly encroaching in the clear zone. Clearing the vegetation should be considered during regular maintenance operations along this road. Trees encroaching in the clear zone should be considered for removal. Toward the end of Lake Road around milepost 11, the cable barrier along a steep hill is in poor condition and should be considered for replacement.

At milepost 3.7, the intersection of 468th Avenue ties into Lake Road at a skew. Nearby, 119th Street, which crosses 468th Avenue 1,000 feet to the north, also ties into Lake Road at a skew less than half a mile from the 468th Avenue intersection. These are dangerous intersections and could easily be remedied with a simple realignment of 119th Street. This would involve a single right-angle tie-in from 119th Street, closing the segment of 468th Avenue between 119th Street and Lake Road and closing the skew tangent of the 119th Street tie-in to Lake Road. See Figure 5.4.

Figure 5.4 Realignment of 119th Street and 468th Ave at Lake Road

5.5.3 Intersections

Over 20% of all crashes on SWO are intersection related. With intersections occurring at most section lines, there is a high potential for intersection crashes. Some intersections have been addressed specifically in the field evaluations. 127th Street and 455th Avenue (south) have several intersection-related crashes. Intersection ahead signs should be installed along these roads where high-volume cross streets are located.

The Dakota Sioux Casino is located on 164th Street (County Road 6). Most traffic travels along 455th Avenue and 447th Avenue to 164th Street to access this casino. These two intersections are outside the boundaries of SWO but affect their tribal members. The intersection of 447th Avenue and 164th Street is a

four-way intersection but is signed with a three-way stop. This is improper signing and could be dangerous because it is unclear to the drivers which leg of the intersection is the through leg. This should be corrected with a four-way stop or studied to determine if a two-way is appropriate.

The intersection of 164th Street and 455th Avenue has experienced several fatalities. A flashing red light is mounted on the large stop sign, and stop-ahead signs are in place for 164th Street approaches (Figure 5.5). It appears from the crash data that collisions are still occurring at this intersection. Transverse rumble strips at the 164th Street approaches to 455th Avenue is recommended. It is also recommended that a four-way stop/signal warrant study be performed for this intersection.

Figure 5.5 164th Street Approach to 455th Avenue

Because of the large number of intersections, it is difficult to address specific concerns in this report. Following is a list of major roadways traversing SWO and major intersections to these roadways. It is recommended that a reservation-wide study be performed to identify intersection improvements. Improvements such as intersection ahead signs, stop sign warrants, and geometric alignments should be addressed in the intersection study. Table 5.6 includes the recommended intersections to study.

Table 5.6 Intersections Recommended for Further Study

Highway	Intersection
SD 25	SD 10
	107 St
SD 106	455 Ave
	459 Ave
	473 Ave
SD 10	BIA 3
	447 Ave
	Lohre Rd
	455 Ave
	BIA 7
	458 Ave
	119 St
127 St	Lohre Rd
	BIA 7
	459 Ave
	462 Ave
446 Ave	137 St
US 12	446A Ave
	Lohre Rd
	455 Ave
	458 Ave
164 St	447 Ave*
	451 Ave
	455 Ave*

*Intersection outside of SWO

5.6 Proposed Safety Improvements

The projects in Table 5.7 are safety improvements proposed for SWO. The tribe should review these improvements and determine which projects they are interested in pursuing for funding and construction.

Table 5.7 Proposed Safety Improvements for SWO

Highway	Project
127 Street	Install Rumble Strip/Stripe
164 Street	Install Transverse Rumble Strip
445 Avenue	Install Curve Warning Signs Install Chevrons Replace Curve Sign Repair pavement and overlay
446 Avenue (South)	Install Rumble Stripe Install Chevrons
446A/446 Avenue	Install Rumble Strip Install Chevrons Replace Double Arrow Sign
455 Avenue (North)	Install Edgelines Install Safety Wedge
455 Avenue (South)	Install Edgelines and Centerline Replace Guardrail Remove Objects in Clear Zone Install Intersection Ahead Signs
459/458 Avenue	Install Safety Wedge Install Delineators in Curve
462 Avenue	Install Edgelines Install Safety Wedge
Lake Road	Install Edgelines and Centerline Clear Vegetation in ROW Replace Guardrail
System-Wide	Speed Study
System-Wide	Intersection Study

5.7 Benefit-Cost Analysis

Once the tribe determines which projects to pursue, a benefit-cost analysis should be performed. Based on countermeasures provided by FHWA in its Desktop Reference for Crash Reduction Factors (FHWA, 2008) and the FHWA Manual for Selecting Safety Improvements on High Risk Rural Roads (Atkinson, et al., 2014), the improvements will be matched with the countermeasures and crash reduction factors (CRFs) assigned. The countermeasures and their respective reduction factors are listed in Table 5.8.

Table 5.8 Countermeasures and Respective CRFs

Countermeasures	Crash Type	Crash Reduction Factors			Service Life
		Fatal	Injury	PDO	
Install guide signs (general)	All	15%	15%	15%	5
Install advance warning signs	All	40%	40%	40%	5
Install chevron signs on horizontal curves	All	35%	35%	35%	5
Install curve advance warning signs	All	30%	30%	30%	5
Install delineators (general)	All	11%	11%	11%	4
Install delineators (on bridges)	All	40%	40%	40%	4
Install edge lines, centerlines and delineators	All	0%	45%	0%	4
Install centerline markings	All	33%	33%	33%	2
Improve sight distance to intersection	All	56%	37%	0%	15
Flatten crest vertical curve	All	20%	20%	20%	15
Flatten horizontal curve	All	39%	39%	39%	15
Improve horizontal and vertical alignments	All	58%	58%	58%	15
Flatten side slopes	All	43%	43%	43%	15
Install guardrail (at bridge)	All	22%	22%	22%	10
Install guardrail (at embankment)	All	0%	42%	0%	10
Install guardrail (outside curves)	All	63%	63%	0%	10
Improve guardrail	All	9%	9%	9%	10
Improve superelevation	All	40%	40%	40%	15
Widen bridge	All	45%	45%	45%	15
Install shoulder	All	9%	9%	9%	5
Pave shoulder	All	15%	15%	15%	5
Install transverse rumble strips on approaches	All	35%	35%	35%	3
Improve pavement friction	All	13%	13%	13%	5
Install animal fencing	Animal	80%	80%	80%	10
Install snow fencing	Snow	53%	53%	53%	10

The cost of a countermeasure is calculated based on present construction costs. Since the crash analysis was performed for a 10-year period, if the service life of a countermeasure was different than 10 years, it was converted to a 10-year cost. For example, if a countermeasure had a service life of five years, the current construction cost would be two times the cost of one application.

The benefit is calculated based on societal crash costs. It represents the cost savings of crashes reduced. A value is assigned to each type of crash severity (fatal, injury, or PDO). The values in Table 5.9 are suggested for use in the analysis. However, the others may be used as the tribe deems appropriate.

Table 5.9 Societal Crash Costs

Crash Cost	
Fatal	$2,500,000
Injury	$60,000
PDO	$6,000

The ratio of benefit to cost is then calculated. Values less than 1.0 would indicate there is no benefit in the improvement and the project should be eliminated. Based on the final analysis the tribe can use the information for funding requests of the projects.

5.8 Chapter Summary

The roadway safety improvement program has been implemented on the Sisseton Wahpeton Oyate reservation. A final list of projects is presented to the tribe to determine their priorities on the reservations.

There are gravel roads identified as high-risk crash locations. Some crashes could be due to the lack of maintenance and some appear to be due to high speeds since these roads are posted at 55 MPH. Many of the paved roads were straight with little to no shoulders. Most of the roads with curves had adequate curve warning signs. However, most crashes were run-off-the-road type. Recommendations are presented for rumble strip/rumble stripe, safety edge, edgelines, and chevrons in curves for low-cost safety improvements. SWO has many rural intersections that need attention to determine the best signage and improvements.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary

Tribal communities have suffered with higher fatality rates on their roadways than the general U.S. population. As the country has been successful in decreasing fatal and injury crashes over the past several years, Native Americans have experienced an increase in these types of crashes.

This report presents a five-step methodology developed to help tribes improve their roadway safety through low-cost improvements. The methodology was successfully implemented on the WRIR with three low-cost projects funded by the Wyoming DOT and other safety measures implemented through identifying safety concerns in their strategic plan.

WYT^2/LTAP and NPTTAP developed criteria for other tribes in the Northern Plains region to participate in implementing the methodology on their reservations. The criteria required a commitment from the tribes to follow through in the program and provide support. Three reservations were selected for implementation: Standing Rock Sioux Tribe (SRST), Sisseton Wahpeton Oyate (SWO), and Yankton Sioux Tribe. This report covers the implementation on the SWO reservation.

6.2 Conclusions

SWO is the third reservation where the five-step methodology has been implemented. Many differences were noted throughout the process, as well as similar challenges faced by tribal governments in implementing safety improvement programs. These included the following:

- SWO seemed to have adequate crash data, which were obtained from the South Dakota DPS.
- SWO had a higher percentage of severe crashes than statewide.
- SWO had more young drivers involved crashes than statewide.
- SWO had a higher percentage of crashes involving alcohol.
- SWO had high compliance with seatbelt/safety equipment use. This could account for fewer fatal rollover crashes.
- There are many intersection crashes on SWO.
- There are many run-off-the-road crashes due to narrow roads with little or no shoulders.
- The tribe had major concerns about the township roads, which receive little maintenance due to limited resources.

6.3 Recommendations

Based on the analysis and the projects identified for SWO, the following recommendations are provided:

- The improvement projects identified in this report should be coordinated with the state DOT as well as with the respective counties for funding.
- The strategic plan should be updated to include the safety concerns identified in this report that are not related to engineering improvements, including speeding, impaired driving, intersection improvements, and pedestrian safety.
- A speed safety study should be performed on 118th Street, 123rd Street, 446A/446th Avenue, and 456th Avenue by the state DOT.
- An intersection study should be performed system-wide to determine best strategy to address intersection crashes.
- The tribe should consider partnering with the townships to pool their resources to provide more consistent maintenance.

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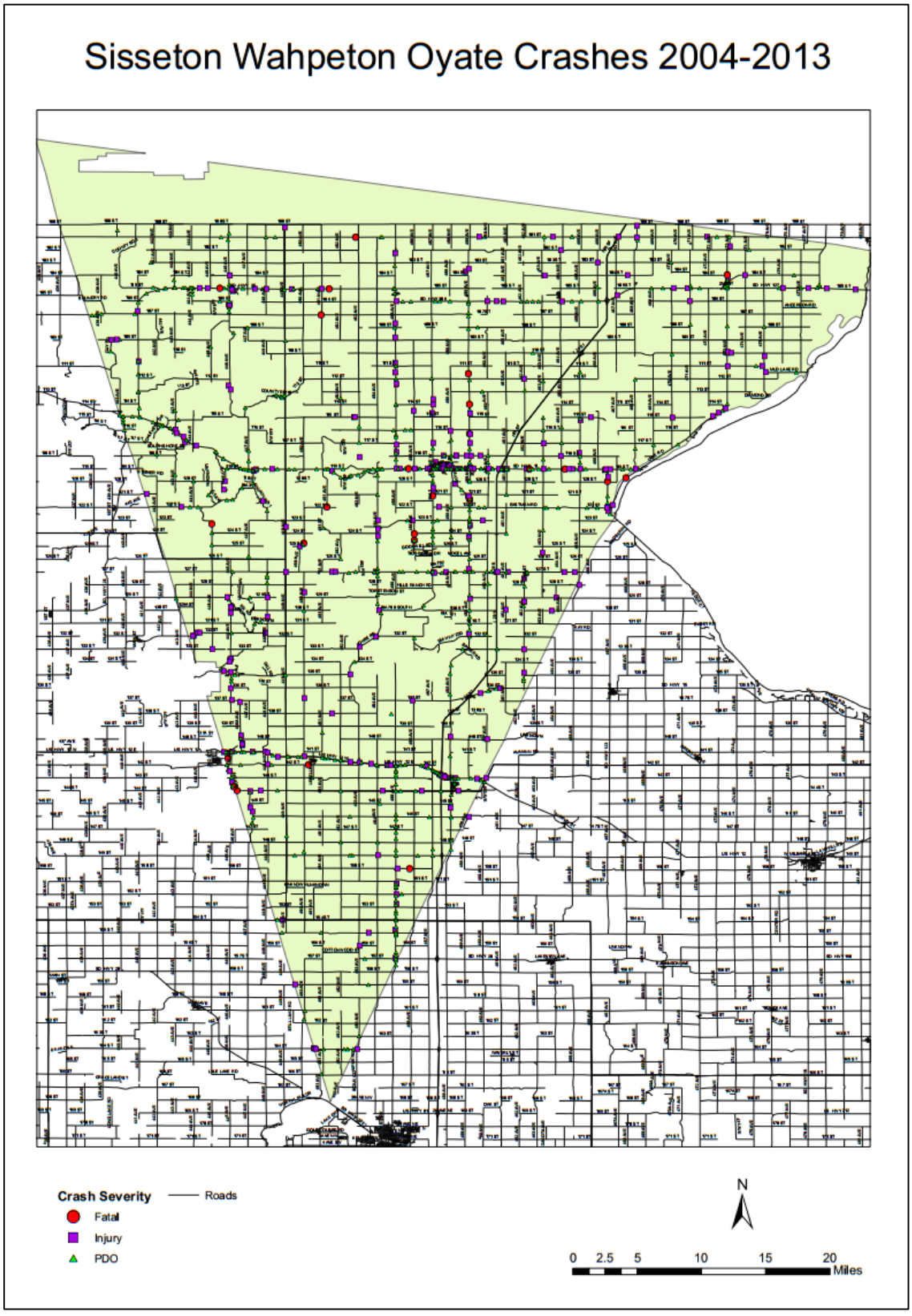
APPENDIX A: MAP OF SWO CRASHES



APPENDIX B: REVISED CRASH RANKINGS

Highway	Beg MP	End MP	Total Crashes	Crash Rank
446A/446 Ave	0	1	6	1
455 Ave (S)	9	10	6	1
459/458 Ave	2	3	6	1
164 St	0	1	5	4
446 Ave (S)	6	7	5	4
455 Ave (S)	0	1	5	4
455 Ave (S)	10	11	5	4
459/458 Ave	5	6	5	4
127 St	8	9	4	9
164 St	2	3	4	9
455 Ave (N)	16	17	4	9
455 Ave (S)	11	12	4	9
455 Ave (S)	12	13	4	9
459/458 Ave	4	5	4	9
BIA 15	13	14	4	9
Lake Rd	10	11	4	9
118 St	3	4	3	17
127 St	9	10	3	17
127 St	10	11	3	17
127 St	11	12	3	17
129/128 St	2	3	3	17
446A/446 Ave	1	2	3	17
446A/446 Ave	4	5	3	17
446A/446 Ave	6	7	3	17
446A/446 Ave	8	9	3	17
446A/446 Ave	12	13	3	17
446A/446 Ave	13	14	3	17
455 Ave (N)	10	11	3	17
455 Ave (N)	11	12	3	17
455 Ave (S)	13	14	3	17
455 Ave (S)	14	15	3	17
459/458 Ave	3	4	3	17
462 Ave	2	3	3	17
473 Ave	6	7	3	17
BIA 3	4	5	3	17
Lohre Rd	10	11	3	17
101 St	0	1	2	37
101 St	8	9	2	37
101 St	9	10	2	37

Highway	Beg MP	End MP	Total Crashes	Crash Rank
101 St	13	14	2	37
118 St	2	3	2	37
123 St	3	4	2	37
127 St	0	1	2	37
127 St	2	3	2	37
127 St	3	4	2	37
127 St	4	5	2	37
127 St	5	6	2	37
127 St	6	7	2	37
127 St	7	8	2	37
127 St	12	13	2	37
127 St	15	16	2	37
445 Ave	2	3	2	37
446 Ave (S)	1	2	2	37
446 Ave (S)	2	3	2	37
446 Ave (S)	4	5	2	37
446 Ave (S)	5	6	2	37
446A/446 Ave	7	8	2	37
455 Ave (N)	1	2	2	37
455 Ave (N)	4	5	2	37
455 Ave (N)	6	7	2	37
455 Ave (N)	9	10	2	37
455 Ave (N)	15	16	2	37
455 Ave (N)	17	18	2	37
455 Ave (S)	4	5	2	37
455 Ave (S)	5	6	2	37
455 Ave (S)	6	7	2	37
455 Ave (S)	15	16	2	37
456 Ave	0	1	2	37
459/458 Ave	0	1	2	37
459/458 Ave	8	9	2	37
459/458 Ave	10	11	2	37
459/458 Ave	11	12	2	37
459/458 Ave	12	13	2	37
459/458 Ave	13	14	2	37
462 Ave	8	9	2	37
473 Ave	1	2	2	37
BIA 15	0	1	2	37
BIA 15	7	8	2	37
BIA 3	1	2	2	37
BIA 3	3	4	2	37

Highway	Beg MP	End MP	Total Crashes	Crash Rank
Lohre Rd	12	13	2	37
Lohre Rd	18	19	2	37
Lohre Rd	19	20	2	37
Lohre Rd	23	24	2	37
101 St	1	2	1	85
101 St	6	7	1	85
123 St	0	1	1	85
123 St	1	2	1	85
123 St	4	5	1	85
129/128 St	0	1	1	85
445 Ave	3	4	1	85
446 Ave (S)	3	4	1	85
446A/446 Ave	3	4	1	85
446A/446 Ave	10	11	1	85
446A/446 Ave	11	12	1	85
455 Ave (N)	2	3	1	85
455 Ave (N)	7	8	1	85
455 Ave (N)	12	13	1	85
455 Ave (N)	13	14	1	85
455 Ave (S)	1	2	1	85
455 Ave (S)	3	4	1	85
455 Ave (S)	7	8	1	85
456 Ave	1	2	1	85
462 Ave	0	1	1	85
462 Ave	1	2	1	85
462 Ave	6	7	1	85
462 Ave	7	8	1	85
473 Ave	0	1	1	85
473 Ave	3	4	1	85
473 Ave	7	8	1	85
473 Ave	9	10	1	85
475 Ave	0	1	1	85
BIA 15	11	12	1	85
BIA 200	5	6	1	85
Lake Rd	0	1	1	85
Lake Rd	2	3	1	85
Lake Rd	3	4	1	85
Lake Rd	6	7	1	85
Lake Rd	9	10	1	85
Lohre Rd	0	1	1	85
Lohre Rd	8	9	1	85

Highway	Beg MP	End MP	Total Crashes	Crash Rank
Lohre Rd	9	10	1	85
Lohre Rd	13	14	1	85
Lohre Rd	14	15	1	85
Lohre Rd	15	16	1	85
Lohre Rd	16	17	1	85
Lohre Rd	21	22	1	85
101 St	2	3	0	128
101 St	3	4	0	128
101 St	4	5	0	128
101 St	5	6	0	128
101 St	7	8	0	128
101 St	10	11	0	128
101 St	11	12	0	128
101 St	12	13	0	128
101 St	14	15	0	128
101 St	15	16	0	128
101 St	16	17	0	128
101 St	17	18	0	128
118 St	0	1	0	128
118 St	1	2	0	128
123 St	2	3	0	128
127 St	1	2	0	128
127 St	13	14	0	128
127 St	14	15	0	128
129/128 St	1	2	0	128
129/128 St	3	4	0	128
164 St	1	2	0	128
445 Ave	0	1	0	128
445 Ave	1	2	0	128
445 Ave	4	5	0	128
445 Ave	5	6	0	128
446 Ave (S)	0	1	0	128
446 Ave (S)	7	8	0	128
446A/446 Ave	2	3	0	128
446A/446 Ave	5	6	0	128
446A/446 Ave	9	10	0	128
455 Ave (N)	0	1	0	128
455 Ave (N)	3	4	0	128
455 Ave (N)	5	6	0	128
455 Ave (N)	8	9	0	128
455 Ave (N)	14	15	0	128

Highway	Beg MP	End MP	Total Crashes	Crash Rank
455 Ave (S)	2	3	0	128
455 Ave (S)	8	9	0	128
456 Ave	2	3	0	128
456 Ave	3	4	0	128
459/458 Ave	1	2	0	128
459/458 Ave	6	7	0	128
459/458 Ave	7	8	0	128
459/458 Ave	9	10	0	128
462 Ave	3	4	0	128
462 Ave	4	5	0	128
462 Ave	5	6	0	128
473 Ave	2	3	0	128
473 Ave	4	5	0	128
473 Ave	5	6	0	128
473 Ave	8	9	0	128
475 Ave	1	2	0	128
BIA 15	1	2	0	128
BIA 15	2	3	0	128
BIA 15	3	4	0	128
BIA 15	4	5	0	128
BIA 15	5	6	0	128
BIA 15	6	7	0	128
BIA 15	8	9	0	128
BIA 15	9	10	0	128
BIA 15	10	11	0	128
BIA 15	12	13	0	128
BIA 15	14	15	0	128
BIA 200	0	1	0	128
BIA 200	1	2	0	128
BIA 200	2	3	0	128
BIA 200	3	4	0	128
BIA 200	4	5	0	128
BIA 3	0	1	0	128
BIA 3	2	3	0	128
Lake Rd	1	2	0	128
Lake Rd	4	5	0	128
Lake Rd	5	6	0	128
Lake Rd	7	8	0	128
Lake Rd	8	9	0	128
Lake Rd	11	12	0	128
Lohre Rd	1	2	0	128

Highway	Beg MP	End MP	Total Crashes	Crash Rank
Lohre Rd	2	3	0	128
Lohre Rd	3	4	0	128
Lohre Rd	4	5	0	128
Lohre Rd	5	6	0	128
Lohre Rd	6	7	0	128
Lohre Rd	7	8	0	128
Lohre Rd	11	12	0	128
Lohre Rd	17	18	0	128
Lohre Rd	20	21	0	128
Lohre Rd	22	23	0	128

APPENDIX C: LEVEL I FIELD EVALUATION RANKING

Highway	Beg MP	End MP	Level I Score	Level I Rank
456 Ave	1	2	7	1
446 Ave (S)	7	8	10	2
455 Ave (S)	0	1	12	3
455 Ave (S)	11	12	14	4
446 Ave (S)	6	7	16	5
456 Ave	0	1	16	5
456 Ave	2	3	16	5
456 Ave	3	4	16	5
462 Ave	0	1	17	9
459/458 Ave	0	1	18	10
462 Ave	4	5	18	10
123 St	0	1	19	12
123 St	1	2	19	12
123 St	2	3	19	12
123 St	3	4	19	12
123 St	4	5	19	12
446A/446 Ave	0	1	19	12
446A/446 Ave	1	2	19	12
446A/446 Ave	2	3	19	12
446A/446 Ave	3	4	19	12
462 Ave	1	2	19	12
462 Ave	2	3	19	12
462 Ave	3	4	19	12
127 St	12	13	20	24
127 St	13	14	20	24
127 St	14	15	20	24
127 St	15	16	20	24
118 St	2	3	21	28
118 St	3	4	21	28
Lake Rd	4	5	21	28
455 Ave (S)	4	5	22	31
455 Ave (S)	5	6	22	31
455 Ave (S)	7	8	22	31
459/458 Ave	1	2	22	31
Lake Rd	0	1	22	31
Lake Rd	1	2	22	31
Lake Rd	2	3	22	31
Lake Rd	3	4	22	31
Lake Rd	5	6	22	31
Lake Rd	6	7	22	31
Lake Rd	7	8	22	31
Lake Rd	8	9	22	31
Lake Rd	9	10	22	31
Lake Rd	10	11	22	31

Highway	Beg MP	End MP	Level I Score	Level I Rank
Lake Rd	11	12	22	31
118 St	0	1	23	46
118 St	1	2	23	46
164 St	0	1	23	46
164 St	1	2	23	46
164 St	2	3	23	46
455 Ave (S)	6	7	23	46
455 Ave (S)	8	9	23	46
455 Ave (S)	9	10	23	46
455 Ave (S)	10	11	23	46
Lohre Rd	8	9	23	46
127 St	0	1	24	56
127 St	1	2	24	56
127 St	2	3	24	56
127 St	3	4	24	56
127 St	9	10	24	56
445 Ave	1	2	24	56
445 Ave	2	3	24	56
445 Ave	3	4	24	56
445 Ave	4	5	24	56
445 Ave	5	6	24	56
455 Ave (S)	1	2	24	56
455 Ave (S)	2	3	24	56
455 Ave (S)	3	4	24	56
475 St	0	1	24	56
475 St	1	2	24	56
BIA 200	2	3	24	56
446 Ave (S)	2	3	25	72
446 Ave (S)	3	4	25	72
446 Ave (S)	4	5	25	72
446 Ave (S)	5	6	25	72
473 Ave	1	2	25	72
101 St	10	11	26	77
101 St	11	12	26	77
101 St	12	13	26	77
101 St	13	14	26	77
101 St	14	15	26	77
101 St	15	16	26	77
101 St	16	17	26	77
101 St	17	18	26	77
BIA 200	1	2	26	77
BIA 200	3	4	26	77
BIA 200	4	5	26	77
BIA 200	5	6	26	77
446A/446 Ave	4	5	27	89
446A/446 Ave	5	6	27	89

Highway	Beg MP	End MP	Level I Score	Level I Rank
446A/446 Ave	6	7	27	89
446A/446 Ave	7	8	27	89
446A/446 Ave	8	9	27	89
446A/446 Ave	9	10	27	89
446A/446 Ave	10	11	27	89
446A/446 Ave	11	12	27	89
446A/446 Ave	12	13	27	89
446A/446 Ave	13	14	27	89
455 Ave (N)	0	1	27	89
455 Ave (N)	1	2	27	89
455 Ave (N)	2	3	27	89
455 Ave (N)	3	4	27	89
455 Ave (N)	4	5	27	89
455 Ave (N)	5	6	27	89
455 Ave (N)	6	7	27	89
455 Ave (N)	7	8	27	89
455 Ave (N)	8	9	27	89
455 Ave (N)	9	10	27	89
455 Ave (N)	10	11	27	89
455 Ave (N)	11	12	27	89
455 Ave (N)	12	13	27	89
455 Ave (N)	13	14	27	89
455 Ave (N)	14	15	27	89
455 Ave (N)	15	16	27	89
455 Ave (N)	16	17	27	89
455 Ave (N)	17	18	27	89
455 Ave (S)	15	16	27	89
459/458 Ave	2	3	27	89
459/458 Ave	3	4	27	89
459/458 Ave	4	5	27	89
459/458 Ave	5	6	27	89
459/458 Ave	6	7	27	89
459/458 Ave	7	8	27	89
459/458 Ave	8	9	27	89
459/458 Ave	9	10	27	89
459/458 Ave	10	11	27	89
473 Ave	0	1	27	89
473 Ave	5	6	27	89
473 Ave	6	7	27	89
473 Ave	7	8	27	89
473 Ave	8	9	27	89
473 Ave	9	10	27	89
BIA 200	0	1	27	89
445 Ave	0	1	28	134
455 Ave (S)	12	13	28	134
455 Ave (S)	13	14	28	134

Highway	Beg MP	End MP	Level I Score	Level I Rank
455 Ave (S)	14	15	28	134
BIA 15	7	8	28	134
BIA 15	13	14	28	134
127 St	8	9	29	140
127 St	10	11	29	140
127 St	11	12	29	140
446 Ave (S)	1	2	29	140
462 Ave	5	6	29	140
462 Ave	6	7	29	140
462 Ave	7	8	29	140
462 Ave	8	9	29	140
BIA 15	5	6	29	140
BIA 15	6	7	29	140
BIA 15	8	9	29	140
BIA 15	9	10	29	140
BIA 15	10	11	29	140
BIA 15	11	12	29	140
BIA 15	12	13	29	140
Lohre Rd	0	1	29	140
Lohre Rd	1	2	29	140
Lohre Rd	2	3	29	140
Lohre Rd	3	4	29	140
Lohre Rd	4	5	29	140
Lohre Rd	5	6	29	140
Lohre Rd	6	7	29	140
Lohre Rd	7	8	29	140
127 St	4	5	30	163
127 St	5	6	30	163
127 St	6	7	30	163
127 St	7	8	30	163
446 Ave (S)	0	1	30	163
473 Ave	4	5	30	163
BIA 15	14	15	30	163
Lohre Rd	9	10	30	163
Lohre Rd	10	11	30	163
Lohre Rd	11	12	30	163
Lohre Rd	12	13	30	163
Lohre Rd	13	14	30	163
Lohre Rd	14	15	30	163
Lohre Rd	15	16	30	163
101 St	4	5	32	177
101 St	5	6	32	177
101 St	6	7	32	177
101 St	7	8	32	177
101 St	8	9	32	177
101 St	9	10	32	177

Highway	Beg MP	End MP	Level I Score	Level I Rank
BIA 15	0	1	32	177
BIA 15	1	2	32	177
BIA 15	2	3	32	177
BIA 15	3	4	32	177
BIA 15	4	5	32	177
101 St	0	1	33	188
101 St	1	2	33	188
101 St	2	3	33	188
101 St	3	4	33	188
473 Ave	3	4	34	192
Lohre Rd	16	17	34	192
Lohre Rd	17	18	34	192
Lohre Rd	18	19	34	192
Lohre Rd	19	20	34	192
Lohre Rd	20	21	34	192
Lohre Rd	21	22	34	192
Lohre Rd	22	23	34	192
Lohre Rd	23	24	34	192
129/128 St	0	1	35	201
129/128 St	1	2	35	201
129/128 St	2	3	35	201
129/128 St	3	4	35	201
459/458 Ave	11	12	35	201
459/458 Ave	12	13	35	201
459/458 Ave	13	14	35	201
473 Ave	2	3	35	201
BIA 3	0	1	38	209
BIA 3	1	2	39	210
BIA 3	2	3	39	210
BIA 3	3	4	39	210
BIA 3	4	5	39	210

APPENDIX D: LEVEL I FIELD EVALUATION WORKSHEETS

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 1
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 454 Avenue	Road Length:
		Road No.:	Road Surface: Asphalt
		Road Class:	Speed Limit: 55

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	3	5	8	9	5	30	Begin at 127 Street (CR 28). No advance warning for int, Stop on 454
1.1 - 2.0	3	5	8	9	5	30	Chip seal over poor pavement, vegetation at edge and into pavment
2.1 - 3.0	3	5	8	9	5	30	2.9 Intersection with BIA 7, no adv. warning, BIA 7 T w/driveway across
3.1 - 4.0	3	5	8	9	5	30	No passing zone no pass with care at end
4.1 - 5.0	3	5	8	9	5	30	5.0 BIA 200 intersection marked -| and double arrow.
5.1 - 6.0	3	5	8	9	5	30	5.5 deteriorated pavement, 6.0 end of chip seal
6.1 - 7.0	3	5	8	9	5	30	
7.1 - 8.0	3	5	8	2	5	23	7.3 curve w trees, skin patching. 7.7 trees in ROW
8.1 - 9.0	3	5	8	8	5	29	8.6 No int sign but has double arrow
9.1 - 10.0	3	5	8	8	5	29	
10.1 - 11.0	3	5	8	8	5	29	
11.1 - 12.0	3	5	8	8	5	29	11.8 No int sign
12.1 - 13.0	3	5	8	8	5	29	
13.1 - 14.0	3	5	8	8	5	29	
14.1 - 15.0	3	5	8	8	5	29	14.1 Object markers for culvert
15.1 - 16.0	3	5	8	8	5	29	15.6 End of road at US 12

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 2
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 455 Avenue (S)	Road Length:
		Road No.: Roberts County Rd. 30	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	3	4	3	1	1	12	Begin at US 12. No stop ahead. 0.4 cable barrier too low, no end mrkrs
1.1 - 2.0	3	4	3	8	6	24	1.7 Old bridge w/markers. 2.0 int w/144 St no int sign, no pvmnt mrk
2.1 - 3.0	3	4	3	8	6	24	
3.1 - 4.0	3	4	3	8	6	24	
4.1 - 5.0	3	4	1	8	6	22	
5.1 - 6.0	3	4	1	8	6	22	6.0 New surface on southbound
6.1 - 7.0	4	4	1	8	6	23	
7.1 - 8.0	3	4	1	8	6	22	8.0 151 St no signs, yield sign on 151 St. Crashes at int
8.1 - 9.0	4	4	1	8	6	23	
9.1 - 10.0	4	4	1	8	6	23	10.0 152 St no sign
10.1 - 11.0	4	4	1	8	6	23	11.0 153 St no signs, high speed right lane, faded stop sign
11.1 - 12.0	4	1	1	2	6	14	No apron, drop off
12.1 - 13.0	5	4	4	8	7	28	12.0 Objects in clear zone, striping at county line
13.1 - 14.0	5	4	4	8	7	28	
14.1 - 15.0	5	4	4	8	7	28	14.2 Old bridge w/ markers. 15.0 Co Rd 20 fatality (Rt 157 St)
15.1 - 16.0	5	4	3	8	7	27	15.5 No curve warning sign, faded pavement marking
							16.0 Sight distance at 158 St? End at 6.0
							*No edgelines, faded centerline
							**Look at MUTCD about yield at intersections

Level I Field Evaluation | Evaluator: DSS | Date: 9/10/14 | Page: 3

Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine

Road Name: County Road 6	Road Length:
Road No.: 164 St	Road Surface:
Road Class:	Speed Limit:

Comments Codington County.
Through to I29 and Casino

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
							Begin at 455 Ave, outside of Reservation. 4 fatlities, flashing at stop,
							fence and steep drop off, recently resurfaced
0.0 - 1.0	7	5	3	3	5	23	453 Ave start Res. at Casino. Sop out of Casino faded, low & small
1.1 - 2.0	7	5	3	3	5	23	Steep slope. 2.9 Bridge
2.1 - 3.0	7	5	3	3	5	23	End at 450 Ave
							No stop ahead sign, 3-way stop at 4-way int (450 Ave)

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 4
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 446 Ave	Road Length:
		Road No.:	Road Surface: Asphalt
		Road Class:	Speed Limit: 55

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	**Comments:** Main route to Watertown, SD (Casino). Heavy traffi, lot of boat traffic to Bitter Lake, weather from lake, cars park on road. Many fatalities.
0.0 - 1.0	6	8	4	7	5	30	Start at south end (148 St). Narrow, no edgeline, no shoulder
1.1 - 2.0	4	8	5	7	5	29	0.7 no curve warning sign but dileneators. hay bails in ROW
2.1 - 3.0	5	3	4	7	6	25	1.0 Road surface change, edgelines, windy. 2.2 top of hill multi-fatality
3.1 - 4.0	5	3	4	7	6	25	1 family, drunk crossed centerline. Truck traffic. 2.2 curve w chevrons
4.1 - 5.0	5	3	4	7	6	25	other curves use delineators. 4.1 fatality, entrance on curve (144 St)
5.1 - 6.0	5	3	4	7	6	25	No passing attached to curve sign. 4.6 curve warning sign
6.1 - 7.0	6	3	4	2	1	16	too close to curve. Fatality at curve. 4.9 access road to lake bad angle
7.1 - 8.0	2	2	2	2	2	10	faded stop . 5.1 fatlaity. 5.6 fatality. End at 6.9 (142 St)
							Turn onto Main St in Wabay, 7.6 RR Xing, rough through town

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 5
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 446A/446 Ave	Road Length:
		Road No.:	Road Surface: Asphalt
		Road Class:	Speed Limit: 55

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	**Comments:** Injuries along road, curvy with intersections in curves
0.0 - 1.0	6	2	6	3	2	19	Start at US12 heading north. Curve speed white mph sign
1.1 - 2.0	6	2	6	3	2	19	Lake at edge of road, no barrier or marking, delineators at curve
2.1 - 3.0	6	2	6	3	2	19	1.9 drop off. 3.0 138 St no adv warning for int
3.1 - 4.0	6	2	6	3	2	19	3.7 Slip when wet w/ rec speed. 3.8 137 St in curve no double arrow
4.1 - 5.0	6	2	5	7	7	27	4.5 tangent exit from 137 St high speed and 3 crashes
5.1 - 6.0	6	2	5	7	7	27	5.3 crash at 136 int.
6.1 - 7.0	6	2	5	7	7	27	6.2 many entrances. 6.3 int 135 St (BIA 5) crashes, no stop ahead
7.1 - 8.0	6	2	5	7	7	27	6.4 curve sign w/ Watch for children sign, crashes on curve, ped cross
8.1 - 9.0	6	2	5	7	7	27	7.0 curve w/ high speed int entrance. 7.5 deep ditch w/ delineators
9.1 - 10.0	6	2	5	7	7	27	8.2 Woodland Park Dr ent at end of curve. 9.0 int w 133 St, crashes
10.1 - 11.0	6	2	5	7	7	27	10.1 132 St int & driveways, no marking
11.1 - 12.0	6	2	5	7	7	27	11.6 Business entrances. 131 & 129 bar entrance at top of hill
12.1 - 13.0	6	2	5	7	7	27	12.0 many entrances, boat traffic, RVs. 12.8 hidden driveway sign
13.1 - 14.0	6	2	5	7	7	27	13.3 End at 129 St (Co Rd 5)

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 6
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: County Road 5	Road Length:
		Road No.: 129 Street	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	**Comments:** Curve from 446 to 448. Mostly intersection crashes. Marshall County
0.0 - 1.0	6	7	5	9	8	35	Start at 446A. No shoulder
1.1 - 2.0	6	7	5	9	8	35	1.0 int at curve
2.1 - 3.0	6	7	5	9	8	35	2.2 Bridge GR needs replaced. 2.7 curve w/ int
3.1 - 4.0	6	7	5	9	8	35	3.2 culvert w/ markers. 3.6 curve w/ int. 3.9 turns into 449
							injury crash at T int.

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 7
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 127 Street	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	**Comments:** Mostly intersection crashes first 8.0 miles
0.0 - 1.0	7	3	4	5	5	24	Start at 449. No pvmnt mrkng, steep slopes, no shoulder
1.1 - 2.0	7	3	4	5	5	24	
2.1 - 3.0	7	3	4	5	5	24	2.4 curve ahead, 2.5 curve no delineation, 2.8 curve w/ arrow
3.1 - 4.0	7	3	4	5	5	24	3.4 curve w/ arrow
4.1 - 5.0	7	7	4	7	5	30	
5.1 - 6.0	7	7	4	7	5	30	
6.1 - 7.0	7	7	4	7	5	30	
7.1 - 8.0	7	7	4	7	5	30	7.3 steep hill w/sign, 7.9 int at bottom of hill & curve, crashes
8.1 - 9.0	4	7	6	7	5	29	Int w/ BIA 700, skewed, high volumes, stop on BIA 700 *
9.1 - 10.0	4	2	6	7	5	24	9.9 crashes at int w/ 459. *Maybe 4-way stop? Signing needed on 459.*
10.1 - 11.0	4	7	6	7	5	29	
11.1 - 12.0	4	7	6	7	5	29	
12.1 - 13.0	4	2	6	3	5	20	13.0 RR Xing at town of Peever, new overlay
13.1 - 14.0	4	2	6	3	5	20	
14.1 - 15.0	4	2	6	3	5	20	BIA 901 int no crashes
15.1 - 16.0	4	2	6	3	5	20	End at 16.0 int 465 Ave. Guy wire in clear zone.
							** Maybe need 4-way stop at 127 and BIA 700?*

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 8
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: Lake Road	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	3	5	5	5	4	22	Begin at 122/SD10, sight distance at SD10 int? crashes
1.1 - 2.0	3	5	5	5	4	22	Trees in ROW near clear zone, narrow, patches, driveways, no shoulder
2.1 - 3.0	3	5	5	5	4	22	vegetation on shoulder, no edgeline
3.1 - 4.0	3	5	5	5	4	22	3.7 skewed int 468, unnecessary tie in. *Should T & square off 468.*
4.1 - 5.0	3	5	5	5	3	21	
5.1 - 6.0	3	5	5	5	4	22	
6.1 - 7.0	3	5	5	5	4	22	
7.1 - 8.0	3	5	5	5	4	22	
8.1 - 9.0	3	5	5	5	4	22	
9.1 - 10.0	3	5	5	5	4	22	Driveways w/ multiple homes
10.1 - 11.0	3	5	5	5	4	22	
11.1 - 12.0	3	5	5	5	4	22	11.7 curve. Cable barrier in bad shape on steep hill
							End at 473 Ave

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 9
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 475 Avenue	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	5	1	2	8	8	24	Superelevated curve, side entrance at curve, turns to gravel
1.1 - 2.0	5	1	2	8	8	24	Curve at Mudd Lake Road and 111 Street
2.1 - 3.0	0	0	0	0	0	0	
3.1 - 4.0	0	0	0	0	0	0	
4.1 - 5.0	0	0	0	0	0	0	
5.1 - 6.0	0	0	0	0	0	0	
6.1 - 7.0	0	0	0	0	0	0	
7.1 - 8.0	0	0	0	0	0	0	
8.1 - 9.0	0	0	0	0	0	0	
9.1 - 10.0	0	0	0	0	0	0	
10.1 - 11.0	0	0	0	0	0	0	
11.1 - 12.0	0	0	0	0	0	0	
12.1 - 13.0							
13.1 - 14.0							
14.1 - 15.0							
15.1 - 16.0							
16.1 - 17.0							
17.1 - 18.0							
18.1 - 19.0							
19.1 - 20.0							

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 10
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 473 Avenue	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	4	5	4	9	5	27	Start at 111 Street. Int no sight distance, no shoulder, no edgeline
1.1 - 2.0	2	5	4	9	5	25	1.1 int w/110 crashes. 1.4 Deer crossing sign
2.1 - 3.0	7	5	8	9	6	35	
3.1 - 4.0	6	5	8	9	6	34	
4.1 - 5.0	7	5	4	9	5	30	
5.1 - 6.0	4	5	4	9	5	27	
6.1 - 7.0	4	5	4	9	5	27	7.0 Bridge abutment fatality
7.1 - 8.0	4	5	4	9	5	27	
8.1 - 9.0	4	5	4	9	5	27	9.3 Stop sign at abandoned road
9.1 - 10.0	4	5	4	9	5	27	End at 10.0

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 11
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 101 Street	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	6	7	6	9	5	33	Start at 473 Ave, no edgeline, no shoulder
1.1 - 2.0	6	7	6	9	5	33	
2.1 - 3.0	6	7	6	9	5	33	
3.1 - 4.0	6	7	6	9	5	33	
4.1 - 5.0	5	7	6	9	5	32	4.9 no stop ahead at 468, sight distance to south limited w/trees
5.1 - 6.0	5	7	6	9	5	32	
6.1 - 7.0	5	7	6	9	5	32	
7.1 - 8.0	5	7	6	9	5	32	
8.1 - 9.0	5	7	6	9	5	32	
9.1 - 10.0	5	7	6	9	5	32	
10.1 - 11.0	1	8	3	9	5	26	
11.1 - 12.0	1	8	3	9	5	26	
12.1 - 13.0	1	8	3	9	5	26	
13.1 - 14.0	1	8	3	9	5	26	
14.1 - 15.0	1	8	3	9	5	26	459 int no stop ahead, on hill, stop sign too small
15.1 - 16.0	1	8	3	9	5	26	
16.1 - 17.0	1	8	3	9	5	26	
17.1 - 18.0	1	8	3	9	5	26	End at 455 Ave

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 12
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 455 Ave (N)	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit: 55

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	5	7	6	5	4	27	Start at 101 Street, N to S
1.1 - 2.0	5	7	6	5	4	27	Several rollover and animal crashes
2.1 - 3.0	5	7	6	5	4	27	Straight and flat, possibly high speeds
3.1 - 4.0	5	7	6	5	4	27	Power poles in clear zone
4.1 - 5.0	5	7	6	5	4	27	*Maybe edgeline rumble strips. Shoulder wedge (safety edge) would help*
5.1 - 6.0	5	7	6	5	4	27	
6.1 - 7.0	5	7	6	5	4	27	
7.1 - 8.0	5	7	6	5	4	27	
8.1 - 9.0	5	7	6	5	4	27	
9.1 - 10.0	5	7	6	5	4	27	
10.1 - 11.0	5	7	6	5	4	27	
11.1 - 12.0	5	7	6	5	4	27	
12.1 - 13.0	5	7	6	5	4	27	
13.1 - 14.0	5	7	6	5	4	27	
14.1 - 15.0	5	7	6	5	4	27	
15.1 - 16.0	5	7	6	5	4	27	
16.1 - 17.0	5	7	6	5	4	27	
17.1 - 18.0	5	7	6	5	4	27	End at SD Hwy 10

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 13
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 459 Ave (N)	Road Length:
		Road No.:	Road Surface: Asphalt
		Road Class: Rural Major Collector	Speed Limit: 65

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	5	3	5	2	3	18	Begin at SD Hwy 10, N to S. Narrow, no pvmet mrk but recent surface
1.1 - 2.0	5	7	5	2	3	22	No Shoulder
2.1 - 3.0	5	7	5	7	3	27	2.5 curve w several crashes, 1 fatal
3.1 - 4.0	5	7	5	7	3	27	
4.1 - 5.0	5	7	5	7	3	27	Rollover and animal crashes
5.1 - 6.0	5	7	5	7	3	27	Narrow, straight - posssibly high speeds
6.1 - 7.0	5	7	5	7	3	27	
7.1 - 8.0	5	7	5	7	3	27	
8.1 - 9.0	5	7	5	7	3	27	8.2 County Rd 5, intersection crash at 125
9.1 - 10.0	5	7	5	7	3	27	High volume through at 459
10.1 - 11.0	5	7	5	7	3	27	*Maybe Transverse Rumble Stips on 127 at approach*
11.1 - 12.0	5	7	5	7	3	27	
12.1 - 13.0	5	7	5	7	3	27	End at 127 St
13.1 - 14.0							
14.1 - 15.0							
15.1 - 16.0							
16.1 - 17.0							
17.1 - 18.0							
18.1 - 19.0							
19.1 - 20.0							

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 14
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 454 Ave. (Lohre Rd.)	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	4	8	8	9	5	34	Start at 127 Street (S to N)
1.1 - 2.0	4	8	8	9	5	34	
2.1 - 3.0	4	8	8	9	5	34	3.0 Int 124, good sight distance, crashes
3.1 - 4.0	4	8	8	9	5	34	
4.1 - 5.0	4	8	8	9	5	34	4.8 Deep drop to culvert >15'
5.1 - 6.0	4	8	8	9	5	34	
6.1 - 7.0	4	8	8	9	5	34	6.8 Deer crossing sign
7.1 - 8.0	4	8	8	9	5	34	
8.1 - 9.0	4	8	8	9	5	34	8.3 end at SD Hwy 10

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 15
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 118 Street	Road Length:
		Road No.: BIA 8	Road Surface: Gravel
		Road Class:	Speed Limit: 45

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	4	8	5	3	3	23	Start at 455 (E to W). Watch for Children sign w/35 mph white sign
1.1 - 2.0	4	8	5	3	3	23	*Road needs reshaping, pull shoulders*
2.1 - 3.0	2	8	5	3	3	21	1.4 Watch for Children sign, 35 mph, residential area
3.1 - 4.0	2	8	5	3	3	21	1.9 Missing object marker at culvert
							2.0 Debris from shaping in lane
							3.0 wide intersection w/ Yield sign on 458, stop on 118 each direction
							End at 4.0 SD Hwy 127 (459 Ave)

Level I Field Evaluation	Evaluator: DSS	Date: 9/11/14	Page: 16
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 456 Ave	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	**Comments:** Township Roads
0.0 - 1.0	2	5	2	5	2	16	Start at BIA 701 & Goodwill Rd. Rough, washboard, no crown,
1.1 - 2.0	2	2	1	1	1	7	gravel washed off road. 0.5 turn onto 456, no signage at int
2.1 - 3.0	2	5	2	5	2	16	1.7 Bridge to be replaced w/10' CMP.
3.1 - 4.0	2	5	2	5	2	16	1.8 int w/124, poor visibility from 124, acute angle w/2 entr from 124.
							Guy wire & PP in clear zone on 124, veg on shldr, fatality at old br on 124
							456 is thru, 124 ends at int.
							3.6 int w/123, poor sight dist due to veg & hill. End at 3.6
							Traveling from 123 and 454:
							124 very low volume, veg in road
							Road closed sign at 452 down in brush
							about 1 mile road ends at water w/ no advanced warning or barricade
							452 fence in ROW near 127

Level I Field Evaluation	Evaluator: DSS	Date: 9/11/14	Page: 17
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 123 Street	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	**Comments:** Township Roads
0.0 - 1.0	3	5	5	3	3	19	Start at 459. 123 wider, no shoulder, curve sign
1.1 - 2.0	3	5	5	3	3	19	School School bus route sign
2.1 - 3.0	3	5	5	3	3	19	
3.1 - 4.0	3	5	5	3	3	19	
4.1 - 5.0	3	5	5	3	3	19	
5.1 - 6.0	3	5	5	3	3	19	End at 454 (Lohre Rd)

Level I Field Evaluation	Evaluator: DSS	Date: 9/11/14	Page: 18
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 445 Avenue	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	7	7	3	8	3	28	Begin at 127 (S to N). Newer surface, no pvmnt marking
1.1 - 2.0	3	7	3	8	3	24	Cross county line, old surface, patching, rough
2.1 - 3.0	3	7	3	8	3	24	
3.1 - 4.0	3	7	3	8	3	24	3.5 curve sign, fatality, driveway in curve
4.1 - 5.0	3	7	3	8	3	24	no curve sign from other direction
5.1 - 6.0	3	7	3	8	3	24	5.7 right angle curve sign for T int and no stop ahead
							End at BIA 3 (122 St)

Level I Field Evaluation	Evaluator: DSS	Date: 9/11/14	Page: 19
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: BIA 3	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	8	8	8	9	5	38	Begin at 445 (122). Overlayed 2009, new signs & pvmnt markings
1.1 - 2.0	8	8	8	9	6	39	0.2 right angle curve sign should be standard curve sign
2.1 - 3.0	8	8	8	9	6	39	chevrons on curve, delineators on curve. 2.0 shoulder wider
3.1 - 4.0	8	8	8	9	6	39	2.0, 2.6 vegetation over sign.
4.1 - 5.0	8	8	8	9	6	39	4.9 end at SD Hwy 10

Level I Field Evaluation	Evaluator: DSS	Date: 9/11/14	Page: 20
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: BIA 15	Road Length:
		Road No.: 447 & 446 Ave	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	7	7	7	5	6	32	Begin at SD Hwy 10. Reconditioned, new gravel w/in 5 yrs for 5 miles
1.1 - 2.0	7	7	7	5	6	32	Needs shoulder work. Trees in ROW
2.1 - 3.0	7	7	7	5	6	32	2.6 shoulder washed out, 2.9 no pipes in approaches
3.1 - 4.0	7	7	7	5	6	32	3.3 shoulder washed out, no pipes in approaches
4.1 - 5.0	7	7	7	5	6	32	4.7 wash out. 4.9 int 115 (Marshal Co 10) confusing signs
5.1 - 6.0	3	7	7	8	4	29	Narrow & rough, needs to be reshaped & gravel
6.1 - 7.0	3	7	7	8	4	29	7.0 deep rutting, drop off
7.1 - 8.0	2	7	7	8	4	28	
8.1 - 9.0	3	7	7	8	4	29	
9.1 - 10.0	3	7	7	8	4	29	
10.1 - 11.0	3	7	7	8	4	29	
11.1 - 12.0	5	7	7	5	5	29	11.3 start gravel again at each end. PP in ROW
12.1 - 13.0	5	7	7	5	5	29	Minimum maintained road - travel at your own risk sign
13.1 - 14.0	4	7	7	5	5	28	12.5 445 yield sign. 13.9 fatality - rollover, high speed
14.1 - 15.0	7	5	6	7	5	30	14.0 paved
							15.0 end at SD Hwy 25

Level I Field Evaluation	Evaluator: DSS	Date: 9/11/14	Page: 21
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 462 Avenue	Road Length:
		Road No.:	Road Surface: Asphalt
		Road Class:	Speed Limit: 55

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	4	4	4	2	3	17	Begin at 127 St (N to S). Houses on east, several int, no edgeline
1.1 - 2.0	3	4	4	5	3	19	Rollovers & 2 domestic animal crashes, all but 2 in winter
2.1 - 3.0	3	4	4	5	3	19	
3.1 - 4.0	3	4	4	5	3	19	
4.1 - 5.0	2	4	4	5	3	18	road breakup
5.1 - 6.0	3	7	7	8	4	29	Int 133 crash poor visibility due to veg, no stop ahead
6.1 - 7.0	3	7	7	8	4	29	
7.1 - 8.0	3	7	7	8	4	29	
8.1 - 9.0	3	7	7	8	4	29	9.0 End at136 St

Level I Field Evaluation	Evaluator: DSS	Date: 9/11/14	Page: 22
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: BIA 200	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	**Comments:** Overlay & shoulder wedge, submitted for BIA for BIA safety funds $5M
0.0 - 1.0	5	5	6	7	4	27	Begin at 459, int crash
1.1 - 2.0	4	5	6	7	4	26	
2.1 - 3.0	4	5	6	7	2	24	Steep slopes & deep
3.1 - 4.0	4	5	6	7	4	26	pot holes & break up about 6 miles
4.1 - 5.0	4	5	6	7	4	26	
5.1 - 6.0	4	5	6	7	4	26	6.0 end at 456 Ave
							Recommend shoulder rumble strip w/ project

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page: 23
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 459 (S)	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments
0.0 - 1.0	7	7	7	9	5	35	Begin at BIA 200 (S to N)
1.1 - 2.0	7	7	7	9	5	35	Ditches relatively steep, road straight
2.1 - 3.0	7	7	7	9	5	35	Rollover & animal crashes, trees in ROW
3.1 - 4.0	7	7	7	9	5	35	
4.1 - 5.0	7	7	7	9	5	35	4.9 End at 127 St
5.1 - 6.0	0	0	0	0	0	0	
6.1 - 7.0	0	0	0	0	0	0	
7.1 - 8.0	0	0	0	0	0	0	
8.1 - 9.0	0	0	0	0	0	0	
9.1 - 10.0	0	0	0	0	0	0	
10.1 - 11.0	0	0	0	0	0	0	
11.1 - 12.0	0	0	0	0	0	0	
12.1 - 13.0							
13.1 - 14.0							
14.1 - 15.0							
15.1 - 16.0							
16.1 - 17.0							
17.1 - 18.0							
18.1 - 19.0							
19.1 - 20.0							

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page:
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 459 Ave	Road Length:
		Road No.:	Road Surface: Asphalt
		Road Class: Rural Major Collector	Speed Limit: 65

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments: This is a combined worksheet for 459 Ave (South) and 459 Ave (North) with revised Mile Posts.
0.0 - 1.0	5	3	5	2	3	18	Begin at SD Hwy 10, N to S. Narrow, no pvmet mrk but recent surface
1.1 - 2.0	5	7	5	2	3	22	No Shoulder
2.1 - 3.0	5	7	5	7	3	27	2.5 curve w several crashes, 1 fatal
3.1 - 4.0	5	7	5	7	3	27	
4.1 - 5.0	5	7	5	7	3	27	Rollover and animal crashes
5.1 - 6.0	5	7	5	7	3	27	Narrow, straight - posssibly high speeds
6.1 - 7.0	5	7	5	7	3	27	6.2 County Rd 5, intersection crash at 125
7.1 - 8.0	5	7	5	7	3	27	High volume through at 459
8.1 - 9.0	5	7	5	7	3	27	8.3 Intersection with 127 St
9.1 - 10.0	5	7	5	7	3	27	Maybe Transverse Rumble Stips on 127 at approach
10.1 - 11.0	5	7	5	7	3	27	Intersection with 127 St
11.1 - 12.0	7	7	7	9	5	35	Rollover & animal crashes, trees in ROW
12.1 - 13.0	7	7	7	9	5	35	Ditches relatively steep, road straight
13.1 - 14.0	7	7	7	9	5	35	13.4 End at BIA 200 (S to N)

Level I Field Evaluation	Evaluator: DSS	Date: 9/10/14	Page:
Notes: Evaluation Team: SWO Transportation Coordinator, Cliff Eberhardt; BIA representative; NP TTAP Director, Dennis, Trusty; WYT^2/LTAP, Debbie Shinstine		Road Name: 454 Ave. (Lohre Rd.)	Road Length:
		Road No.:	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments: This is a combined worksheet for 454 Ave (South) and 454 Ave (North) with revised Mile Posts.
0.0 - 1.0	3	5	8	8	5	29	Begin at US 12 (S to N)
1.1 - 2.0	3	5	8	8	5	29	1.5 Object markers for culvert
2.1 - 3.0	3	5	8	8	5	29	
3.1 - 4.0	3	5	8	8	5	29	
4.1 - 5.0	3	5	8	8	5	29	3.8 No int sign
5.1 - 6.0	3	5	8	8	5	29	
6.1 - 7.0	3	5	8	8	5	29	
7.1 - 8.0	3	5	8	8	5	29	7.0 No int sign but has double arrow
8.1 - 9.0	3	5	8	2	5	23	8.3 curve w trees, skin patching. 7.9 trees in ROW
9.1 - 10.0	3	5	8	9	5	30	
10.1 - 11.0	3	5	8	9	5	30	10.1 deteriorated pavement, 9.6 end of chip seal
11.1 - 12.0	3	5	8	9	5	30	10.6 BIA 200 intersection marked -| and double arrow.
12.1 - 13.0	3	5	8	9	5	30	No passing zone no pass with care at end
13.1 - 14.0	3	5	8	9	5	30	12.7 Intersection with BIA 7, no adv. warning, BIA 7 T w/driveway across
14.1 - 15.0	3	5	8	9	5	30	Chip seal over poor pavement, vegetation at edge and into pavment
15.1 - 16.0	3	5	8	9	5	30	Intersection w/ 127 St (CR 28). No advance warning for int, Stop on 454
16.1 - 17.0	4	8	8	9	5	34	
17.1 - 18.0	4	8	8	9	5	34	
18.1 - 19.0	4	8	8	9	5	34	19.0 Int 124, good sight distance, crashes
19.1 - 20.0	4	8	8	9	5	34	
20.1 - 21.0	4	8	8	9	5	34	20.8 Deep drop to culvert >15'
21.1 - 22.0	4	8	8	9	5	34	
22.1 - 23.0	4	8	8	9	5	34	22.8 Deer crossing sign
23.1 - 24.0	4	8	8	9	5	34	
24.1 - 25.0	4	8	8	9	5	34	end at SD Hwy 10

APPENDIX E: COMBINED RANKING

Highway	Beg MP	End MP	Total Crashes	Crash Rank	Level I Score	Level I Rank	Combined Rank
101 St	0	1	2	37	33	188	225
101 St	1	2	1	85	33	188	273
101 St	2	3	0	128	33	188	316
101 St	3	4	0	128	33	188	316
101 St	4	5	0	128	32	177	305
101 St	5	6	0	128	32	177	305
101 St	6	7	1	85	32	177	262
101 St	7	8	0	128	32	177	305
101 St	8	9	2	37	32	177	214
101 St	9	10	2	37	32	177	214
101 St	10	11	0	128	26	77	205
101 St	11	12	0	128	26	77	205
101 St	12	13	0	128	26	77	205
101 St	13	14	2	37	26	77	114
101 St	14	15	0	128	26	77	205
101 St	15	16	0	128	26	77	205
101 St	16	17	0	128	26	77	205
101 St	17	18	0	128	26	77	205
118 St	0	1	0	128	23	46	174
118 St	1	2	0	128	23	46	174
118 St	2	3	2	37	21	28	65
118 St	3	4	3	17	21	28	45
123 St	0	1	1	85	19	12	97
123 St	1	2	1	85	19	12	97
123 St	2	3	0	128	19	12	140
123 St	3	4	2	37	19	12	49
123 St	4	5	1	85	19	12	97
127 St	0	1	2	37	24	56	93
127 St	1	2	0	128	24	56	184
127 St	2	3	2	37	24	56	93
127 St	3	4	2	37	24	56	93
127 St	4	5	2	37	30	163	200
127 St	5	6	2	37	30	163	200
127 St	6	7	2	37	30	163	200
127 St	7	8	2	37	30	163	200
127 St	8	9	4	9	29	140	149
127 St	9	10	3	17	24	56	73
127 St	10	11	3	17	29	140	157
127 St	11	12	3	17	29	140	157

Highway	Beg MP	End MP	Total Crashes	Crash Rank	Level I Score	Level I Rank	Combined Rank
127 St	12	13	2	37	20	24	61
127 St	13	14	0	128	20	24	152
127 St	14	15	0	128	20	24	152
127 St	15	16	2	37	20	24	61
129/128 St	0	1	1	85	35	201	286
129/128 St	1	2	0	128	35	201	329
129/128 St	2	3	3	17	35	201	218
129/128 St	3	4	0	128	35	201	329
164 St	0	1	5	4	23	46	50
164 St	1	2	0	128	23	46	174
164 St	2	3	4	9	23	46	55
445 Ave	0	1	0	128	28	134	262
445 Ave	1	2	0	128	24	56	184
445 Ave	2	3	2	37	24	56	93
445 Ave	3	4	1	85	24	56	141
445 Ave	4	5	0	128	24	56	184
445 Ave	5	6	0	128	24	56	184
446 Ave (S)	0	1	0	128	30	163	291
446 Ave (S)	1	2	2	37	29	140	177
446 Ave (S)	2	3	2	37	25	72	109
446 Ave (S)	3	4	1	85	25	72	157
446 Ave (S)	4	5	2	37	25	72	109
446 Ave (S)	5	6	2	37	25	72	109
446 Ave (S)	6	7	5	4	16	5	9
446 Ave (S)	7	8	0	128	10	2	130
446A/446 Ave	0	1	6	1	19	12	13
446A/446 Ave	1	2	3	17	19	12	29
446A/446 Ave	2	3	0	128	19	12	140
446A/446 Ave	3	4	1	85	19	12	97
446A/446 Ave	4	5	3	17	27	89	106
446A/446 Ave	5	6	0	128	27	89	217
446A/446 Ave	6	7	3	17	27	89	106
446A/446 Ave	7	8	2	37	27	89	126
446A/446 Ave	8	9	3	17	27	89	106

Highway	Beg MP	End MP	Total Crashes	Crash Rank	Level I Score	Level I Rank	Combined Rank
446A/446 Ave	9	10	0	128	27	89	217
446A/446 Ave	10	11	1	85	27	89	174
446A/446 Ave	11	12	1	85	27	89	174
446A/446 Ave	12	13	3	17	27	89	106
446A/446 Ave	13	14	3	17	27	89	106
455 Ave (N)	0	1	0	128	27	89	217
455 Ave (N)	1	2	2	37	27	89	126
455 Ave (N)	2	3	1	85	27	89	174
455 Ave (N)	3	4	0	128	27	89	217
455 Ave (N)	4	5	2	37	27	89	126
455 Ave (N)	5	6	0	128	27	89	217
455 Ave (N)	6	7	2	37	27	89	126
455 Ave (N)	7	8	1	85	27	89	174
455 Ave (N)	8	9	0	128	27	89	217
455 Ave (N)	9	10	2	37	27	89	126
455 Ave (N)	10	11	3	17	27	89	106
455 Ave (N)	11	12	3	17	27	89	106
455 Ave (N)	12	13	1	85	27	89	174
455 Ave (N)	13	14	1	85	27	89	174
455 Ave (N)	14	15	0	128	27	89	217
455 Ave (N)	15	16	2	37	27	89	126
455 Ave (N)	16	17	4	9	27	89	98
455 Ave (N)	17	18	2	37	27	89	126
455 Ave (S)	0	1	5	4	12	3	7
455 Ave (S)	1	2	1	85	24	56	141
455 Ave (S)	2	3	0	128	24	56	184
455 Ave (S)	3	4	1	85	24	56	141
455 Ave (S)	4	5	2	37	22	31	68
455 Ave (S)	5	6	2	37	22	31	68
455 Ave (S)	6	7	2	37	23	46	83
455 Ave (S)	7	8	1	85	22	31	116
455 Ave (S)	8	9	0	128	23	46	174
455 Ave (S)	9	10	6	1	23	46	47
455 Ave (S)	10	11	5	4	23	46	50
455 Ave (S)	11	12	4	9	14	4	13
455 Ave (S)	12	13	4	9	28	134	143
455 Ave (S)	13	14	3	17	28	134	151

Highway	Beg MP	End MP	Total Crashes	Crash Rank	Level I Score	Level I Rank	Combined Rank
455 Ave (S)	14	15	3	17	28	134	151
455 Ave (S)	15	16	2	37	27	89	126
456 Ave	0	1	2	37	16	5	42
456 Ave	1	2	1	85	7	1	86
456 Ave	2	3	0	128	16	5	133
456 Ave	3	4	0	128	16	5	133
459/458 Ave	0	1	2	37	18	10	47
459/458 Ave	1	2	0	128	22	31	159
459/458 Ave	2	3	6	1	27	89	90
459/458 Ave	3	4	3	17	27	89	106
459/458 Ave	4	5	4	9	27	89	98
459/458 Ave	5	6	5	4	27	89	93
459/458 Ave	6	7	0	128	27	89	217
459/458 Ave	7	8	0	128	27	89	217
459/458 Ave	8	9	2	37	27	89	126
459/458 Ave	9	10	0	128	27	89	217
459/458 Ave	10	11	2	37	27	89	126
459/458 Ave	11	12	2	37	35	201	238
459/458 Ave	12	13	2	37	35	201	238
459/458 Ave	13	14	2	37	35	201	238
462 Ave	0	1	1	85	17	9	94
462 Ave	1	2	1	85	19	12	97
462 Ave	2	3	3	17	19	12	29
462 Ave	3	4	0	128	19	12	140
462 Ave	4	5	0	128	18	10	138
462 Ave	5	6	0	128	29	140	268
462 Ave	6	7	1	85	29	140	225
462 Ave	7	8	1	85	29	140	225
462 Ave	8	9	2	37	29	140	177
473 Ave	0	1	1	85	27	89	174
473 Ave	1	2	2	37	25	72	109
473 Ave	2	3	0	128	35	201	329
473 Ave	3	4	1	85	34	192	277
473 Ave	4	5	0	128	30	163	291
473 Ave	5	6	0	128	27	89	217
473 Ave	6	7	3	17	27	89	106
473 Ave	7	8	1	85	27	89	174
473 Ave	8	9	0	128	27	89	217
473 Ave	9	10	1	85	27	89	174
475 Ave	0	1	1	85	24	56	141

Highway	Beg MP	End MP	Total Crashes	Crash Rank	Level I Score	Level I Rank	Combined Rank
475 Ave	1	2	0	128	24	56	184
BIA 15	0	1	2	37	32	177	214
BIA 15	1	2	0	128	32	177	305
BIA 15	2	3	0	128	32	177	305
BIA 15	3	4	0	128	32	177	305
BIA 15	4	5	0	128	32	177	305
BIA 15	5	6	0	128	29	140	268
BIA 15	6	7	0	128	29	140	268
BIA 15	7	8	2	37	28	134	171
BIA 15	8	9	0	128	29	140	268
BIA 15	9	10	0	128	29	140	268
BIA 15	10	11	0	128	29	140	268
BIA 15	11	12	1	85	29	140	225
BIA 15	12	13	0	128	29	140	268
BIA 15	13	14	4	9	28	134	143
BIA 15	14	15	0	128	30	163	291
BIA 200	0	1	0	128	27	89	217
BIA 200	1	2	0	128	26	77	205
BIA 200	2	3	0	128	24	56	184
BIA 200	3	4	0	128	26	77	205
BIA 200	4	5	0	128	26	77	205
BIA 200	5	6	1	85	26	77	162
BIA 3	0	1	0	128	38	209	337
BIA 3	1	2	2	37	39	210	247
BIA 3	2	3	0	128	39	210	338
BIA 3	3	4	2	37	39	210	247
BIA 3	4	5	3	17	39	210	227
Lake Rd	0	1	1	85	22	31	116
Lake Rd	1	2	0	128	22	31	159
Lake Rd	2	3	1	85	22	31	116
Lake Rd	3	4	1	85	22	31	116
Lake Rd	4	5	0	128	21	28	156
Lake Rd	5	6	0	128	22	31	159
Lake Rd	6	7	1	85	22	31	116
Lake Rd	7	8	0	128	22	31	159
Lake Rd	8	9	0	128	22	31	159
Lake Rd	9	10	1	85	22	31	116
Lake Rd	10	11	4	9	22	31	40
Lake Rd	11	12	0	128	22	31	159
Lohre Rd	0	1	1	85	29	140	225
Lohre Rd	1	2	0	128	29	140	268

Highway	Beg MP	End MP	Total Crashes	Crash Rank	Level I Score	Level I Rank	Combined Rank
Lohre Rd	2	3	0	128	29	140	268
Lohre Rd	3	4	0	128	29	140	268
Lohre Rd	4	5	0	128	29	140	268
Lohre Rd	5	6	0	128	29	140	268
Lohre Rd	6	7	0	128	29	140	268
Lohre Rd	7	8	0	128	29	140	268
Lohre Rd	8	9	1	85	23	46	131
Lohre Rd	9	10	1	85	30	163	248
Lohre Rd	10	11	3	17	30	163	180
Lohre Rd	11	12	0	128	30	163	291
Lohre Rd	12	13	2	37	30	163	200
Lohre Rd	13	14	1	85	30	163	248
Lohre Rd	14	15	1	85	30	163	248
Lohre Rd	15	16	1	85	30	163	248
Lohre Rd	16	17	1	85	34	192	277
Lohre Rd	17	18	0	128	34	192	320
Lohre Rd	18	19	2	37	34	192	229
Lohre Rd	19	20	2	37	34	192	229
Lohre Rd	20	21	0	128	34	192	320
Lohre Rd	21	22	1	85	34	192	277
Lohre Rd	22	23	0	128	34	192	320
Lohre Rd	23	24	2	37	34	192	229