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INDIAN RESERVATION SAFETY IMPROVEMENT PROGRAM: A METHODOLOGY AND CASE STUDY

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FORWARD

The purpose of this study was to develop a methodology for Tribal communities to identify low-cost safety improvement on their roadways. The Wyoming Technology Transfer/Local Technical Assistance Program (WYT^2/LTAP) was directed by the Wyoming Department of Transportation (WYDOT) to develop this methodology so that Tribes could successfully apply for Highway Safety Improvement Program funds for their rural roads.

A literature review was performed to determine if other studies existed and how they might be applied to this work. History of Tribal-government relations was looked at to obtain an understanding of how to work with the Tribes. Crash history was reviewed to determine the magnitude of the safety issues on Indian reservations. A five-step methodology was introduced for use on Indian Reservations. The methodology was implemented on the Wind River Indian Reservation (WRIR) and low-cost improvement projects were successfully funded. Crash reporting discrepancies were also identified and improvements were applied and further recommendations given. The collaboration with the WRIR triggered the move to develop a strategic highway safety plan for the reservation. The development of that plan is included in this study.

State departments of transportation (DOTs), Tribal transportation agencies, Tribal Technical Assistance Programs (TTAPs) and LTAPs, along with other safety stakeholders concerned with improving safety on Tribal lands are among the audiences interested in this report.

A paper entitled "Indian Reservation Safety Improvement Program: A Methodology and Case Study" has been submitted and approved for publication to the Transportation Research Board. Another paper entitled "Wind River Indian Reservation Strategic Safety Management Plan" has been submitted to the Institute of Transportation Engineers for publication the ITE Journal. This paper is still pending approval for publication.

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16. Abstract:

The need to reduce fatal and injury crashes on Tribal lands has been recognized for years. The U.S. has realized a decline in fatal crashes over the past several years but fatal crashes continue to increase on Tribal lands. Little progress has been made in improving safety on Tribal lands. Limited resources and lack of coordination across jurisdictions has made it difficult for Native American communities to address their roadway safety concerns. The rural nature of many of their roadways and lack of crash data has also made it difficult for Tribes to implement an effective safety improvement program. A methodology that is able to address these challenges is presented in this report to assist Tribes in reducing fatal and injury crashes. The proposed methodology has been implemented successfully in the Wind River Indian Reservation. Key to the success of such a process is collaboration among safety stakeholders, namely the State departments of transportation, Tribal leadership, Local Technical Assistance Program (LTAP), Tribal Technical Assistance Program (TTAP), Bureau of Indian Affairs (BIA), and local and Tribal law enforcement.

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Metric Conversion Table

SI* (MODERN METRIC) CONVERSION FACTORS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
	NOTE: volumes greater than 1000 L shall be shown in m^3			
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	pound force	4.45	newtons	N
lbf/in^2	pound force per square inch	6.89	kilopascals	kPa

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
°C	Celsius	1.8C+32	Fahrenheit	°F
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.

(Revised March 2003)

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CHAPTER 1. INTRODUCTION

Safety on the U.S. highways is of primary concern for all agencies. Since the 1950s, the U.S. has strived to make our highways safer and reduce fatal crashes. The 1966 Highway Safety Act was one the first of many efforts by the U.S. government to reduce severe crashes by requiring states to develop and maintain highway safety programs [(1)]. Although fatal crashes have dropped over the last several years, the U.S. has not kept pace with the rest of the developing world. In 2007, fatalities per 100,000 population in the U.S. was at 13.6, whereas in the United Kingdom it was 5.0 and in Australia, 7.6. Even our neighbors to the north in Canada have a lower rate at 8.4 [(2)]. These rates are even higher on rural and Indian Reservation roadways.

The goal of the Wyoming Strategic Highway Safety Plan (WSHSP) is to reduce the number of fatal and serious injury crashes [(3)]. These efforts are supportive of the National goal to eliminate traffic deaths through a campaign known as "Towards Zero Deaths" (TZD). The Wind River Indian Reservation (WRIR) is among the many partners in the state striving to achieve this goal. The Wyoming Department of Transportation (WYDOT) has funded this study to develop a methodology for Indian reservations to identify high risk crash locations and implement low cost safety improvements to work toward this goal.

BACKGROUND

The U.S. government has recognized for years the need for improved Tribal traffic safety. Numerous reports have been published on the significant fatality rates among Native Americans and the trends that persist. In 2002, the motor vehicle crash mortality rate for American Indians per 100,000 persons was more than two times the national average for all races [(4)]. These high rates are attributable to many factors including unsafe roads, driving error, non-use of safety restraints and the disregard of roadway rules. This has a great impact on the tribal communities and their families. With limited tribal government resources, the development and sustainability of a traffic safety program is challenging [(4)].

An understanding of their roadway system is necessary in addition to other factors that are unique to Tribal lands. Many reservations are typically rural with a rural roadway system. They face similar challenges that other rural communities face in trying to improve safety on their roadways. Local governments also frequently lack the resources to address safety on their roadways. Rural roads account for about 40 percent of the vehicle miles travelled in the country but have the highest fatality rates on the highway systems across the United States [(5)]. In 2007, 57 percent of traffic fatalities occurred on rural roads with only 23 percent of the Nation's population living in rural areas [(6)]. The reason crashes on rural roadways are more serious and result more often in fatalities is due to several factors including extreme terrain, higher speeds, higher number of crashes involving alcohol use and longer response time for emergency services. Indian reservations experience similar crash statistics at an even greater magnitude.

Other factors to consider are the behavioral issues that contribute to the safety of their roadways. The National Tribal Transportation Safety Summit Report [(7)] indicates that among the many safety concerns facing Native Americans on reservation roadways, impaired driving and the use

of seat belts/child safety seats are the highest concerns [7]. The report also notes that crash data are inadequate for many Indian reservations.

The Native American community has suffered greatly over the years with higher fatality rates on their roadways than the general population across the U.S. In a report by the National Center for Statistics & Analysis [8], fatal crashes in the United States dropped at a rate of 2.2 percent between 1975 and 2002 but on Indian reservations they increased by 52.5 percent. Nearly 63 percent of these fatalities involved persons aged 35 years or younger. In 2002, 38 percent of passenger occupant fatalities across the nation were restrained whereas only 16 percent were restrained on Indian reservations. 42 percent of fatal crashes on Indian reservations were related to speeding. Alcohol accounted for 65 percent of fatal crashes since 1982 on reservations [8].

As previously stated, the safety goal for the US Department of Transportation is to work toward eliminating fatal and serious injury crashes [9]. Under the previous transportation bill, Safe Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), the High Risk Rural Roads Program (HRRRP) as a subset of the Highway Safety Improvement Program (HSIP) was established to address the high fatality and serious injury crash rates on rural roadways. High risk rural roads are defined as roadways with a functional classification of rural major collector, rural minor collector or rural local roads which have a fatality and incapacitating injury rate greater than a state's average, or the roadway is likely to experience an increase in traffic volumes that would lead to a crash rate higher than the state's average [10].

According to a report published by Federal Highway Administration (FHWA) Office of Safety, many states have had difficulty meeting their obligation of funds and the criteria set forth to access them to improve safety on their rural roads [6]. Wyoming has developed the Wyoming Rural Road Safety Program (WRRSP) through the Wyoming Technology Transfer Center/Local Technical Assistance Program (WYT^2/LTAP) to assist the counties across the state to overcome the challenges of meeting the criteria of the HRRRP.

WYT^2/LTAP received funding from WYDOT and FHWA to assist Wyoming counties to identify high risk rural crash locations and develop a strategy to obtain funding for safety improvements for the highest rank locations [11]. The WRRSP program was developed in 2009 and is a five-step methodology that includes the analysis of crash data, field evaluation and benefit-cost analysis to identify and prioritize low cost safety improvements [12]. This methodology helps direct the selection of high risk locations based both on field conditions and historical crash data. This program was initially implemented in three counties and has since been implemented by more than half the 23 counties throughout the state. Each year counties successfully apply to WYDOT for safety funds for low cost safety improvements utilizing this methodology to identify their high risk crash locations.

In all the strides that have been made across the country, including Wyoming, to provide assistance to localities to identify and apply for funding for safety improvements on their rural roadway system, none has provided comprehensive tools for the Indian reservations to do the same. Indian nations are unique from their other rural counterparts in that they are sovereign nations and do not fall under the jurisdiction of the states. Their government structure is

typically smaller, stretching their expertise and resources to their limits. This often times brings them short of successfully implementing a highway safety improvement program. They need to have some mechanism to assist them in identifying sites for improvement, to help them better assess their priorities and determine how they can allocate resources for safety improvements.

WYDOT has provided funding to WYT^2/LTAP to similarly develop a methodology for Indian reservations that was developed for Wyoming counties. With an understanding of the challenges and unique needs of Tribal communities, a program needs to be developed that can aid Tribes in addressing their highway safety concerns. A safety improvement program that helps tribes identify high crash locations and implement low cost improvements will have a significant impact on reducing fatal and serious injury crashes on reservations.

PROJECT OBJECTIVES

The objective of this project was to develop a methodology for identifying high risk locations on Indian reservation roads. Such methodology would result in implementing a low cost safety improvement program which should help in reducing the high crash rates on Indian reservations. WYT^2/LTAP in cooperation with WYDOT developed the WRRSP to help local governments in improving safety on their high risk locations. Since Indian reservation roads are similar to rural local roads, modifying the WRRSP to fit the needs of Indian reservations provides Indian Nations with the opportunity to identify low cost safety improvements and then apply for and allocate funding for these improvements. This methodology also provides a tool for Indian Nations across the country to be able to utilize funds for safety improvements on their roadway systems.

A secondary objective of this project was to identify gaps in crash data on Indian reservations and make recommendations to bridge these gaps. Crash data is critical to identify high risk locations and therefore it is imperative that the incomplete or lack of crash data be resolved to provide a successful program for identifying safety improvements on the Indian reservations.

This report includes a case study of the Wind River Indian Reservation (WRIR) in Wyoming. The methodology developed was implemented on the WRIR and the results were analyzed to demonstrate the effectiveness of the methodology.

REPORT ORGANIZATION

This report consists of seven sections. A literature review comprises Chapter 2, identifying the various components of safety that went into the development of the Indian Reservation Safety Improvement Program. Chapter 3 is a discussion of crash trends identified on Indian reservations. Chapter 4 lays out the methodology developed for the Indian reservation safety improvement program. Chapter 5 discusses the results of the implementation of the program on the Wind River Indian Reservation. Chapter 6 presents the problems with crash reporting discovered on the WRIR and remedies to improve it. Chapter 7 is a discussion of the WRIR Strategic Safety Highway Safety Plan that was born out of the efforts involved in the development of the safety improvement program methodology. Finally, Chapter 8 provides conclusions and recommendations to the objectives laid out in this project.

In addition to the methodology presented, the WRIR strategic plan is presented. As a result of collaboration with the tribes on the development of the methodology, the team worked together to apply for the Pilot Tribal Traffic Safety Management Program. WRIR was one of three applicants selected for the program and the FHWA provided the resources to develop their strategic plan which addresses the many safety concerns outlined in this report.

CHAPTER 2. LITERATURE REVIEW

ROADWAY SAFETY HISTORY ON INDIAN RESERVATIONS

Relations between the U.S. government and American Indian Tribes have evolved over the past 200 years. Changes in these relationships were a result of the different approaches the government took at the time to address the current situation. Six time periods define these changes starting with the Formative period from 1780 to 1825 and the current period of Self-Determination that started in 1961 [(13)]. Between the Assimilation and Allotment period (1871 – 1928) and the Reorganization period (1928 – 1945), the Indian Reservation Road (IRR) program was established by Congress on May 26, 1928 [(14)]. IRR roads are identified as public roads that provide access on and to Indian reservations. These roads are managed by the Bureau of Indian Affairs (BIA). The IRR program provides the means by which Tribes can obtain funding for the planning, design, construction and maintenance of these roads [(15)].

The Tribal Transportation Program (TTP) was established in 1983 through a Memorandum of Agreement between the BIA and FHWA. This program is intended to address the transportation needs of the Tribes across the U.S. and provide safe and adequate transportation on these public roads [(16)]. It is through these programs that the Tribes can receive funding directly from the federal government for their transportation systems. The transportation authorization bills that are passed by Congress provide specific funding for their IRR roads.

As Tribes were given more authority since the self-determination period (1961-Present) has emerged, they found that they lacked the resources and expertise to carry out many of the responsibilities formerly assumed by the state or federal government. In 1991, FHWA created the Tribal Technical Assistance Program (TTAP) to assist Tribes with the management of their transportation networks [(17)]. With seven regional centers across the country, they provide the Tribes with training, information, updates on new technology and personalized assistance with their transportation programs and are helping Tribes improve their roadway safety. TTAPs work closely with the FHWA to provide assistance with the many federal programs available to the Tribes concerning safety. [(17)]

These programs have provided the tools for Tribal governments to get organized and obtain funding to address their highway safety concerns. However, the Native American communities still lag far behind the U.S. in being able to effectively reduce fatal and serious injury crashes on their reservations.

According to the Centers for Disease Control (CDC), Injuries are the leading cause of death for American Indians and Alaskan natives up to age 44 and motor vehicle crashes are the leading cause of unintentional injury for them. The motor vehicle-related death rate is more than twice that of whites. Low seat belt use, low child safety seat use and alcohol impaired driving are the major risk factors found among American Indians and Alaskan natives [(18)].

Tribal transportation safety summits have been held across the country since 2008. The primary goal of these summits is to reduce crash-related injuries and deaths among American Indians.

They are a collaborative effort to identify the challenges, share successes and explore opportunities to improve safety. FHWA, BIA, Tribal representatives, state departments of transportation (DOTs), Local Transportation Assistance Program (LTAP) and TTAP are among the safety stakeholders at these summits [7].

The challenges that have been identified at these summits have common themes. Tribes across the country share similar safety concerns of impaired driving, seat belt/child safety seat use, lane departures, speeding and pedestrian safety. Tribal stakeholders suffer from a lack of resources including funding, personnel, and technology. Crash data is commonly inadequate among the Tribal communities. Tribes often lack the expertise needed to perform the various tasks involved in identifying and developing a traffic safety program. These summits have recognized the need for better communication and collaboration among the stakeholders. Lastly, jurisdictional issues have hindered the Tribes' ability to effectively manage their transportation safety [7]. The summits have performed a significant role in increasing awareness of the problems faced by American Indians in improving transportation safety on Tribal lands.

An earlier study written in the mid-1980s by Phillip A May [19] identified some relationships that should be considered when addressing the high crash fatality rates among American Indians. The American Indian population has been growing at twice the rate of the rest of the U.S. population. This has brought the median age of the American Indian down to 22.9 years in 1980. Whereas the median age of the U.S. population as a whole was at 30.3 years during the same time frame. This could account for much when reviewing crash data and alcohol involvement [19]. Other considerations to take into account include the fact that most Indians live in the western United States, which is typically rural. Also, the average income among Indians was about half that of the U.S. and education levels remain lower than the national average [19].

Other issues that contribute to the high fatal crash rates on Indian reservations could be attributed to the condition of their roadways. Of the 90,000 miles of IRR roads maintained by the BIA across the U. S., less than half of them are paved. According to condition ratings reported by FHWA, 45 percent of their roads are rated as poor and only 16 percent as good [20]. Compounding this with the nature of their roadway system being typically rural, driving behaviors such as higher speeds and the use of alcohol increases the chances of fatal and serious injury crashes on their roadways.

These many issues are well recognized by Tribal leadership and through collaborative efforts they are making strides towards addressing the safety of their roadways. As sovereign nations, many Tribes are starting to pass and enforce laws on their reservations to address their roadway safety problems. They are sensitive to the behavioral issues that are contributing to the high fatal and serious injury crash rates. They are aware of the poor condition of their roads and struggle to access the resources needed to improve them. Their recognition of the cultural differences and challenges faced by their young people has led the Tribal leadership to take other proactive measures to reach out to their people to help shape their attitudes and change their driving behaviors for improved traffic safety. Safety stakeholders such as FHWA, TTAPs, and LTAPs can provide resources and technical expertise to assist the Tribes in fulfilling their goals to reduce fatal and serious injury crashes.

CRASH REPORTING

The importance of complete and proper crash reporting is recognized as inadequate among Tribal communities [7]. Many factors include the lack of information on the severity, location, and contributing causes. Many times crashes will go unreported altogether. This is a result of several issues such as limited law enforcement resources and lack of training for proper data collection and data entry. In addition, many times the vehicles will be removed from the crash scene before any law enforcement is notified or arrives.

A South Dakota study on crash reporting among their nine reservations [21] indicated that even though reported crashes showed that crash fatality rates among Native Americans in South Dakota were three times greater than others, they also lacked sufficient crash data. The study group obtained additional crash reports from the Tribes which were not in the standard form used by the state. After obtaining this data it was estimated that 64 percent of crashes on Tribal lands was under reported [21]. Figure 1 indicates the actual crashes for 2005 for before the additional crash data was collected during the study and the total after the study. The crash data collected during the study were reports that the state, county, city, or Tribes did not previously have in their systems.

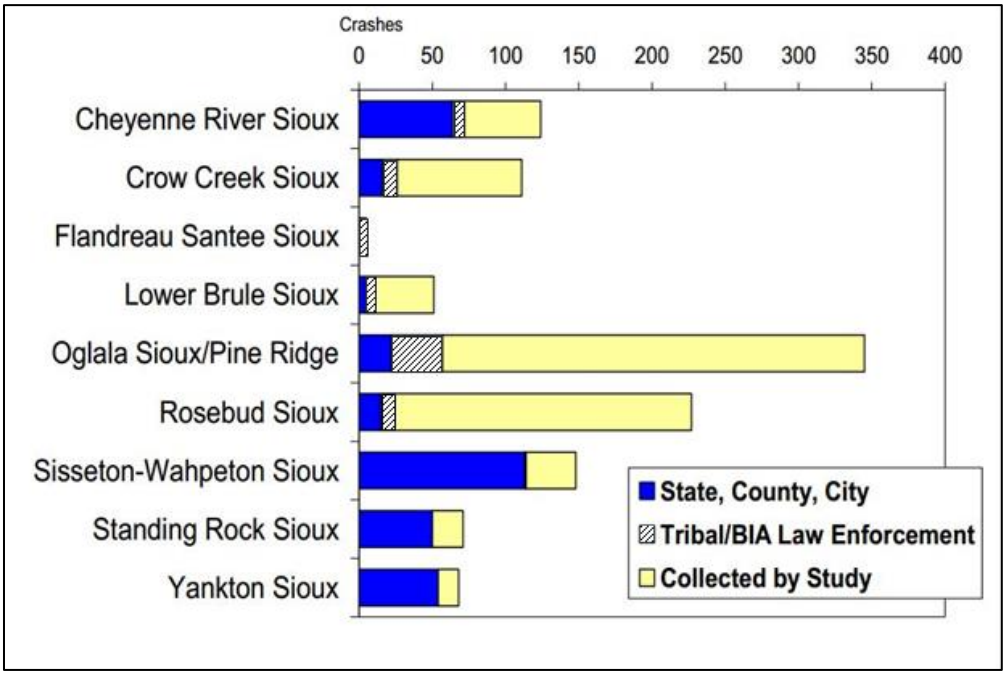


Figure 1. Graph. South Dakota Motor Vehicle Crashes for 2005, Before and After Study, Within Reservation Boundaries as Defined by 2000 Census. [21]

The study identified that the main problem areas were the tribal law enforcement's ability to report the crashes, and the Tribes' relationship with the state. Factors that contribute to the incomplete reporting include the ability of the Tribal law enforcement to properly report the crashes either because of lack of resources, unclear understanding of state reporting requirements, and limited information technology sources.

Another factor is the standardization of reporting methods. These vary among the Tribal administrations and there exists conflict between the state and BIA requirements. They also follow different crash reporting and investigation protocols. [21] If the state has an electronic reporting system the Tribal law enforcement needs to have the same system as well as training on the use of it.

As sovereign nations, the Tribes are not obligated to submit their crash reports to the state agency. Many times they are hesitant to provide detailed information to outside agencies not understanding or knowing how that information will be used. The Tribes need to be assured that the data collection is essential to improving traffic safety and that the information would not be used to adversely impact the tribe or the individual driver involved in a crash. Better communications among agencies need to be established and more formal understanding between the Tribes and the state are necessary to improve crash reporting. [21]

The Native American communities across the U.S. have recognized the need for improved crash reporting. The Tribal Transportation Summits have made it a theme issue in their efforts to improve transportation safety [7]. States and individual tribes are starting to engage in efforts to improve the reporting and management of crash data so it can be utilized more effectively in identifying safety improvements both physical and behavioral. Tribal leadership and government agencies are endeavoring to overcome the many obstacles that hinder progress on this effort.

The use of crash data to improve the safety of their roadways needs to be understood by Tribal governments. Performing crash analysis can take on many forms and provides decision makers critical information on what improvements or programs should be initiated. Accurate and complete crash data can be confidently used to develop safety models that can provide specific information on problem areas, causal factors, and behavioral factors involved and how they affect the seriousness of the crash. Trends are easily identified when the data is complete. Having accurate locations is significant and can be incorporated into a geographical information system (GIS) that could be connected to roadway inventories. This would provide more specific information on roadway geometrics and pavement conditions that can be included in the analysis of crashes.

Building trust between the Tribes and the government is key to this success. Tribal sovereignty has been in jeopardy before and therefore Tribes must be assured that they will remain sovereign. As this trust is built among the leadership, they can reach out to their people to change the culture to improve the safety on their roadways by getting the agencies to cooperate and provide the needed crash information and by preserving the crash scene for law enforcement to properly report the crash. As states reach out to the Tribes by offering assistance including funding for safety improvements and identifying the need for accurate crash data in order to be able to provide assistance, these trends of inadequate crash reporting can be reversed.

COMMUNICATION, COLLABORATION AND COORDINATION

In order for any tribal transportation program to be a success, there must be open communication, extensive coordination efforts as well as full cooperation among the many agencies involved. "Cooperation on transportation issues is affected by complex issues such as tribal sovereignty, intergovernmental agreements, jurisdiction, regional planning efforts, right-of-way acquisition, funding, and maintenance. Similarly, planning, design, and implementation of transportation projects require collaboration among tribal, federal, and state agencies." [22]. Collaboration is essential among the tribal, federal, state and local governments to implement a transportation safety program. Many stakeholders are necessary in the development of such plan and buy-in is absolutely necessary by every stakeholder.

In 1998, the president signed Executive Order 13084, requiring government agencies to consult with tribes on any projects that affect their communities. This helped formalize government-to-government agreements with the Tribes as well as streamlining the federal processes for them. Many states have established a Tribal liaison position between the DOT and the Tribes; they have organized intergovernmental summits, and developed best practices guides and references. To further strengthen relations with the Tribes, some agencies have launched research studies and assessments to identify the issues, practices, and programs affecting transportation projects on Tribal lands. [22]

Some weaknesses that exist between state agencies and Tribal governments are evident in specific project execution. Though the preconstruction process requires extensive involvement, post construction as it relates to operations and maintenance is lacking [22]. Responsibilities for maintenance and operations need to be clearly agreed upon to ensure lasting benefits. This is the area where many transportation safety issues exist. There is no clear understanding among the agencies and Tribes as to who is responsible to address these concerns and how to obtain the necessary resources.

Transportation program management and operations issues have evolved over the years to accommodate the relationships between government agencies such as the federal and state governments. The formation of AASHTO and legislative and financial support has facilitated such relationships. However, only recently have tribal-state-federal relationships been identified as needing improvement and development [23]. In 1999, the Transportation Research Board (TRB) resolved to have a conference to specifically address the issue of communication, coordination, and cooperation between the agencies to identify ways to improve these efforts to better accomplish the transportation goals on Tribal lands.

Best practice cases were presented at the conference to determine effective development of these relationships. It is imperative to the success of the transportation programs and projects that occur on Indian reservations. New Mexico and Arizona Departments of Transportation as well as various tribal transportation agencies, presented these cases and their experiences to what is working well and what still needs to be accomplished to improve these relationships between the tribes and local and state governments. The DOTs and many tribes have worked diligently to develop relationships to ensure that the transportation needs are addressed in the context of the Tribes' priorities and culture.

The New Mexico Highway and Transportation Department (NMSHTD) recognized that the 22 Tribes represented in the state had been involved at the project level but not in the long-range and strategic planning level. They held a summit to address these issues and developed a framework for policies and processes to include coordination with the Tribes. With the improved coordination efforts to address Tribal issues statewide, they recognized the uniqueness of each Tribe and the importance of dealing with them individually. [23]
Sovereignty issues are continually arising when states and tribes judicial systems have conflicting jurisdictional views. When legislation does not specifically address these issues, the state and tribal governments are left with resolving these issues through agreements or resorting to the state or tribal courts. Whether it is the state or the tribe, their perception of government-to-government relationships is assumed to be only with the federal government. However, the states have been more empowered through the years in transportation matters and funding. Regional transportation planning is being emphasized more for both state and tribal governments requiring more local coordination efforts. Intergovernmental agreements (IGAs) are essential and need to be executed to assign responsibilities for actions between the agencies to ensure compliance to those responsibilities [23]. This requires the full cooperation for each agency involved.

There are many factors that impact Tribal transportation decisions. They include cultural competency, protection and preservation of tribal-sensitive resources, confidentiality of tribal sensitive matters, sovereignty, land ownership, and funding issues [24]. These factors are complex and must be considered during intergovernmental collaboration on transportation projects. Since the 1960s, the U.S. government has worked to increase tribal self-determination, giving the tribes more power to decide their own direction on transportation issues. This is a shift from the direction the government had been taking concerning tribal sovereignty. From the early days of the "Agreements between Equals" in the late eighteenth and early nineteenth century the notion was to endeavor to assimilate rather than allow self-determination.

With this shift, the tribal-state-federal relationships in regards to transportation issues are a fairly new concept with no precedence to turn to for guidance on how to proceed. From formal legislative actions to state level initiatives, collaboration efforts between the agencies are being launched to address the transportation needs on Tribal lands. Knowing how to identify their needs and who to go to for assistance is fundamental in Tribes being able to proceed with their transportation programs. From the state and local government perspective, roadway systems that traverse the reservations require Tribal input and collaboration to ensure the Tribe's cultural assets are protected and the state or local government is able to pursue the needed roadway improvement or expansion.

The National Cooperative Highway Research Program (NCHRP) Report 690 [24] provides the background of these issues. One of the greatest challenges in coordinating jurisdictional issues is right-of-way whether concerning work on or regulatory jurisdiction of travelers and crashes. Many times the courts have had to rule on the interpretation of the law and yet there is still conflict between agencies on who has the authority to act and make decisions. The report provides guidelines for successful collaboration among agencies with specific cases across the states that have implemented successful programs to collaborate with their respective tribes.

Every tribe is different and must be treated individually in the context of their culture. Forging trusting relationships is the beginning of understanding and working together to achieve everyone's goals of improving transportation safety.

STRATEGIC HIGHWAY SAFETY PROGRAM

The mission of the FHWA Office of Safety is to reduce highway fatalities providing information and resources to safety decision-makers and champions. Under the previous highway transportation bill, SAFETEA-LU, the Highway Safety Improvement Program (HSIP) was established. This program was designed to address the high rate of fatal and serious injury crashes on roadways across the U.S. A major component of the program is a Strategic Highway Safety Plan (SHSP), which is required for all states. The SHSP is a statewide plan that is comprehensive and driven by crash data. It sets goals and objectives, identifying key focus areas and integrating the four E's of safety (Engineering, Education, Enforcement and Emergency response) [(25)]. This plan is a collaborative process involving the state DOT and other local, state, and federal safety stakeholders.

The Federal Lands Highways (FLH) under the FHWA provides Tribal transportation safety initiatives to support the Tribes in their highway safety improvement efforts. The Tribal Transportation Safety Management System (SMS) is a program that encourages communication, coordination, collaboration and cooperation among the safety stakeholders committed to Tribal transportation safety with the goal of implementing effective transportation safety programs to save lives while respecting the American Indian culture and traditions [(26)]. This program includes a SHSP for Indian Lands. It is a model for all tribes to follow and addresses the common concerns found among tribes across the country. The following eight emphasis areas address the safety concerns of reducing fatal and serious injury crashes:

- Decision making process.
- Data Collection.
- Run off the road crashes.
- Occupant protection/child restraint.
- Alcohol/drug impaired driving.
- Other driver behavioral and awareness.
- Drivers under the age of 35.
- Pedestrian safety.

Each of these emphasis areas contains goals and strategies to accomplish them through physical and behavioral solutions. The first emphasis area (decision making process) can be challenging for tribes as they may have to work with safety stakeholders across jurisdictions. Tribes also need better data collection (second emphasis area). The remaining emphasis areas are data driven.

The State of Wyoming is committed to reducing the number of fatal and serious injury crashes and has established priorities in their WSHSP to accomplish this goal [(3)]. They have established six focus areas based on analysis of crash data which include lane departure, safety equipment use/non-use, young drivers (25 years and younger), curve crashes, speeding and impaired

driving. The state is committed to working with local governments to meet this goal and expect all local level partners to implement the plan to the degree possible based on their resources and needs. The coordination efforts set forth in the strategic plan allow the local partners to identify their own specific safety concerns and the best countermeasures for them [(3)].

Among the local partners in Wyoming is the WRIR. Both Tribal leadership and state officials recognize the need for the reservation to adopt its own safety program that addresses their unique challenges to reduce fatal and serious injury crashes. The emphasis areas identified in the WSHSP, which include roadway departure crashes, use of safety restraints, impaired driving and speeding are also priorities for the WRIR. High risk rural roads, a special safety area addressed in the plan, are a primary focus for the reservation since virtually all of their roadway system is rural.

Through the Inter Tribal Council of Arizona, Inc., a four-task model process and guidelines were developed in 2004 to assist Tribes to get organized and develop a traffic safety program [(4)]. The process consists of:

1) Determine whether a Tribe has a highway safety problem.
2) Select funding sources.
3) Plan for a Tribal Highway Safety Improvement Project (THSIP) or highway safety project.
4) Implement the Tribal Hazard Elimination Safety (HES) program project based on the plan.

The first three tasks are administrative in nature and are designed to help the Tribes get organized to incorporate traffic safety into their government structure. The fourth task is the implementation of the HES. This process is intended to assist the Tribes to be in the position to compete for highway safety funds effectively.

The process and implementation guidance is based on the HES program which was replaced by the Highway Safety Improvement Program (HSIP) SAFETEA-LU. SAFETEA-LU has since been replaced by the new transportation bill, Moving Ahead for Progress in the 21st Century Act (MAP-21) which is more streamlined and performance-based.

However, many of the principals can apply concerning the development of the program. The implementation would require changes that are applicable today. Specifically, tasks one and two are beneficial in getting Tribes started with a safety program and to identify possible funding options. The next step of determining the scope of the program or projects as well as the implementation needs to follow the current requirements. Task three provides an outline for Tribes to develop their Transportation Safety Management Program which is required under the current law.

In 2007, the same group that developed the four-task process and implementation guidelines performed a study utilizing the guidelines for three tribes in Arizona which were selected through a competitive process [(27)]. This research was intended to provide the tribes the tools to build their traffic safety capacity. At the same time the project was used to assess the tribal model process and guidelines previously established. In order to assist the tribes in developing their safety capacity, five areas were identified:

- Decision-making.
- Data collection and storage.
- Equipment and software.
- Project prioritization.
- Project development, implementation and evaluation.

Teams were formed under the tribal leadership and were composed of the various safety stakeholders. Progress was realized by the three tribes in building their traffic safety capacity but not to the extent necessary to realize the potential success. The lack of good crash data as well as limited resources constrained this success [(27)].

Strategic highway safety plans are essential in addressing the many safety concerns faced by any community. They provide a means to get organized and identify the responsibilities of the many stakeholders. It should reflect the specific goals of the community. Each Tribe has its own unique culture and understands best how to affect change in their community to improve roadway safety. A strategic highway safety plan developed by each individual Tribe in collaboration with their safety stakeholders is an effective tool that provides a clear path for them to follow to realize their goals of improved safety on their roadways.

ROAD SAFETY AUDITS

Road Safety Audits (RSA) are intended to provide an objective analysis of the safety of a particular roadway location. Safety concerns are identified and mitigating opportunities to improve safety performance are presented. The FHWA defines an RSA as a "formal safety performance evaluation of an existing or future road or intersection by an independent, multidisciplinary team" [(28)]. They are unlike the traditional informal safety reviews which are typically performed by small design teams. RSAs are formal reviews that are more comprehensive than a safety review. Table 1 presents the differences between an RSA and a safety review [(29)]. The field review is an essential part of the audit which is performed by a multidisciplinary team. RSAs are comprehensive and proactive. They consider all factors that may contribute to a crash and all users of the roadway system. They have been proven to be effective in reducing roadway crashes [(30)].

Table 1. Difference Between RSA and Safety Review [29].

Road Safety Audit	Traditional Safety Review
Performed by a team independent of the project.	The safety review team is usually not completely independent of the design team.
Performed by a multi-disciplinary team.	Typically performed by a team with only design and/or safety expertise.
Considers all potential road users.	Often concentrates on motorized traffic.
Accounting for road user capabilities and limitations is an essential element of an RSA.	Safety Reviews do not normally consider human factor issues.
Always generates a formal RSA report.	Often does not generate a formal report.
A formal response report is an essential element of an RSA.	Often does not generate a formal response report.

RSAs on Tribal lands have unique challenges because of the multi-jurisdictional issues, cultural, historical and environmental constraints. One of the key elements of success is the selection of the team. One example of success is an RSA that was conducted for the Navajo Nation in Utah. The team consisted of the Navajo DOT, Navajo police, Utah DOT, BIA, Indian Health Services (IHS), FHWA, and County officials. The different insights and perspectives contributed to identifying improvements that included educational road safety campaigns that are unique to the demographics of the reservation [28].

The FHWA Office of Safety and FHWA Office of Federal Lands commissioned four Tribal road safety audits in 2005-2007 to demonstrate the usefulness and effectiveness of RSAs for Tribal agencies [31]. Through these RSA case studies, the team members identified six key elements for a successful RSA [31]:

1. The RSA team must acquire a clear understanding of the project background.
2. Recurring concerns identified in multiple tribal RSAs may reflect safety issues typical of tribal transportation environments.
3. The involvement of multiple road agencies in the design, operation, and maintenance of roads on tribal lands can present a challenge, and can also help promote a successful RSA outcome.
4. The RSA team and Design team need to work in a cooperative fashion to achieve a successful RSA result.
5. A “local champion” can greatly help to facilitate the establishment of RSAs.
6. The RSA field review should be scheduled during regular recurring traffic conditions.

In a Tech Brief published by WYT^2/LTAP [32], RSAs and RSA Reviews (RSAR) are identified as proactive safety tools that most local agencies do not utilize. Localities fear they would become vulnerable to tort liability once they have identified safety deficiencies and do not have the resources to address them. However, these tools can be utilized with as little or as much sophistication the locality wants to be able to build a safety program. A documented program is

a stronger defense than no program. In reference to the NCHRP Synthesis 336, these tools are designed to fit the specific needs of the agency. Safety solutions are specific to each and they should be tailored to those needs [32].

RSAs can be used as a template to perform field reviews for a safety improvement program. Along with crash analysis, field reviews provide an opportunity to identify conditions that would contribute to the hazards. A multidisciplinary team provides insights and can identify the various factors involved and recognize countermeasures necessary to address the safety concerns.

WYOMING RURAL ROAD SAFETY PROGRAM

The WRRSP was developed to assist counties and cities in Wyoming to identifying low cost safety improvements on their local and rural roads [30]. This program was in response to the provisions set forth in the SAFETEA-LU legislation passed in 2005. This legislation established the HSIP as a core program with specific funding set aside for states to address safety improvements on high risk rural roads [10]. The HRRRP was not being utilized to its potential and the obligation rate of funds was low. States lacked clear direction on how to determine the criteria and implement the program for their rural roads.

With very low population and high vehicle miles traveled, Wyoming needed a methodology to identify these high risk locations beyond the criteria set forth in the HRRRP. The WRRSP utilizes methodology that was developed to address these unique challenges. It is designed to help local agencies reduce crashes and fatalities on their rural roads. The methodology incorporates both historical crash data and field conditions to determine the high risk locations.

The research that went into this program first looked at the roadway classification systems used throughout the state. Then a methodology was developed to use available data to include crash records, traffic volumes, speed and so forth to predict crashes on rural roads. With this, a five-step methodology was established so specific safety countermeasures could be identified. Finally, a procedure was developed to perform an economic analysis for the safety countermeasures. The methodology instituted by the WRRSP includes the following steps [30]:

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

Through the analysis of crash data, initial high risk locations are identified and selected for a field evaluation to determine the various factors that identify the condition of the roadway. These roadways are ranked based on worst to best condition and then the crash rank and the field evaluation rank are combined. A combined rank provides the list of the highest risk roads that are then selected for another field evaluation. This evaluation identifies safety improvements as possible countermeasures to reduce crashes at these locations. Cost estimates of the improvements are produced. Based on Crash Reduction Factors (CRF) and the benefits of

crashes being avoided a benefit-cost analysis is performed. The benefit-cost ratio calculated for each project reveals how much improvement in crash reduction can be realized and these are ranked to determine the priority of the projects. From this, projects are selected for funding request from the state.

The study also included the establishment of a Local Road Safety Advisory Group (LRSAG) made up of representatives from WYDOT, WT^2/LTAP, Wyoming Association of County Engineers and Road Supervisors (WACERS), Wyoming Association of Municipalities (WAM), and FHWA. This group's purpose is to provide input and advice into the process as the research proceeded [30].

As part of the project of developing the five-step methodology, a pilot study was executed in three counties throughout the state to assess the effectiveness of the program. The five-step methodology was initially implemented in Carbon, Laramie and Johnson counties under this pilot study [30]. Projects were submitted to WYDOT and approved for funding in 2009. Projects were submitted for each of the roads determined as the high risk locations and included low-cost safety improvements such as advanced warning signs, installation of wider cattle guards, object markers and delineators, and pavement markings.

WYDOT funds 90.49 percent of project costs up to $100,000 of federal funds and the counties are responsible for a 9.51 percent match. WYT^2/LTAP worked with WYDOT to develop a program guide for counties across the state to use to establish a safety improvement program in their county. WYT^2/LTAP also provides assistance to the individual counties to identify low cost safety improvement projects using the methodology. They also assist them with the project proposals [30]. The WRRSP program has since been successfully implemented in over half of the 23 counties in the state and many low cost safety improvement projects have been funded and installed. Table 2 contains the list of the projects submitted for funding by the program.

As a final stage in the program, WYT2/LTAP monitors the progress of the projects and identifies the actual benefits realized by the improvement project [30]. After studies at least three years subsequent to project completion are performed to determine the actual crash reduction at the high risk locations. Then true crash reduction factors can be concluded. This would provide more accurate assessment for future safety improvements in the benefit-cost analysis.

The WRRSP was used as a template to formulate the methodology used for the Indian Reservation Safety Improvement Program. Enough similarities exist because of the rural nature of the roadway systems on Indian reservations. Combining the crash data with field reviews along with input from the Tribes, a comprehensive safety improvement program can be implemented.

Table 2. Projects Submitted for WRRSP Funding

	County / Project Number	Project Type	Completed Application	Cooperative Agreement
ROUND #1	Carbon CN06065	Signs, Del., & Culvert Ext.	10/1/2008	7/23/2009
	Johnson CN16022	Signs, Del. Striping	10/1/2008	6/15/2009
	Laramie CN02090	Signs & Cattle Guards	10/1/2008	8/6/2009
	Lincoln CN12051	Striping 11 Rds.	4/28/2009	9/18/2009
	Lincoln CN12052	Signs 5 Rds.	4/28/2009	9/18/2009
	Lincoln CN12053 GR	Guardrail 2 Rds.	4/28/2009	9/18/2009
	Sheridan CN03033	Signs Spot Grading	5/5/2009	9/30/2009
	Sheridan CN03034	Signs Spot Grading	5/5/2009	9/30/2009
ROUND # 2	Big Horn CN09056	Signs & Realignment	6/6/2009	8/5/2010
	Fremont CN10095	Guardrail	1/12/2010	8/5/2010
	Fremont CN10096	Guardrail	1/12/2010	8/5/2010
	Lincoln CN12054	Shoulder/Slope Imp 2 Rds.	8/16/2010	9/5/2010
	Lincoln CN12055	Culvert Extension 3 Rds.	8/16/2010	9/5/2010
	Lincoln CN12056	Fence Removal	8/16/2010	9/5/2010
	Lincoln CN12057	Guardrail	8/16/2010	9/5/2010
	Lincoln CN12058 MB	Reset Mailboxes	8/16/2010	9/5/2010
	Lincoln CN12059	Striping 11 Rds.	8/16/2010	9/5/2010
ROUND # 3	Big Horn CN09057	Signs & Realignment	8/26/2010	8/12/2011
	Carbon CN06067	Signs, Rumble St., & Striping	8/24/2010	8/19/2011
	Crook CN18059	Signs, Del., & Striping	9/16/2010	8/15/2011
	Goshen CN07104	Road Widening	9/7/2010	8/15/2011
	Lincoln CN12060 MB	Reset Mailboxes	8/16/210	9/12/2011
	Sheridan CN03036	Culverts, Grading, & Gravel	3/4/2011	8/15/2011
	SIGN PROGAM	10 Counties	Dec-10	Summer 2011
ROUND #4	Lincoln 12065	Shoulder Improvement	10/1/2011	6/21/2013
	Converse	Signs & Delineators	5/13/2013	
	Converse	Striping	5/13/2013	
	Big Horn	RAP	1/31/2013	Not Awarded
	Lincoln 12067	Delineators	1/31/2013	6/21/2013
	Lincoln 12064	Signs	1/31/2013	7/3/2013
	Lincoln 12063	Striping 11 Rds.	1/31/2013	6/21/2013
	Lincoln 12062	Guardrail	1/31/2013	7/3/2013
	Lincoln 12066	Shoulder Improvement		7/3/2013
	Park CN11070	Striping 15 Rds.	1/31/2013	5/24/2013
	Sheridan CN03038	Realignment	1/31/2013	6/11/2013
	Shoshone Arapaho DOT	Signs 16 Rds.	1/31/2013	
	Shoshone Arapaho DOT	Guardrail	1/31/2013	
	Shoshone Arapaho DOT	Striping 16 Rds	1/31/2013	

Completed Projects

CHAPTER SUMMARY

This chapter provided a literature review that lays out the background for this study. Understanding the history of roadway safety on Indian reservations provides basis for how to approach the development of a program. Indian-government relations have evolved over the years. Only recently self-determination has been recognized by the federal government. With this, programs have been established to assist Tribes with their transportation needs.

Crash reporting has been documented as being insufficient on Indian reservations. Many factors contribute to this including lack of resources and training as well as a lack of trust by the Tribes to provide sensitive information to outside agencies. Tribal sovereignty is closely guarded by the Tribes. Through continued efforts by government agencies to reinforce the need for cooperation, they can begin to build relationships to work together to address their highway safety concerns.

Strategic Highway Safety Programs are required by the federal government for all states. Their purpose is to establish goals and objectives, and to identify key focus areas to reduce fatal and serious injury crashes on their roadways. Tribal governments need to develop their own strategic plans that identify their goals that are unique to their culture.

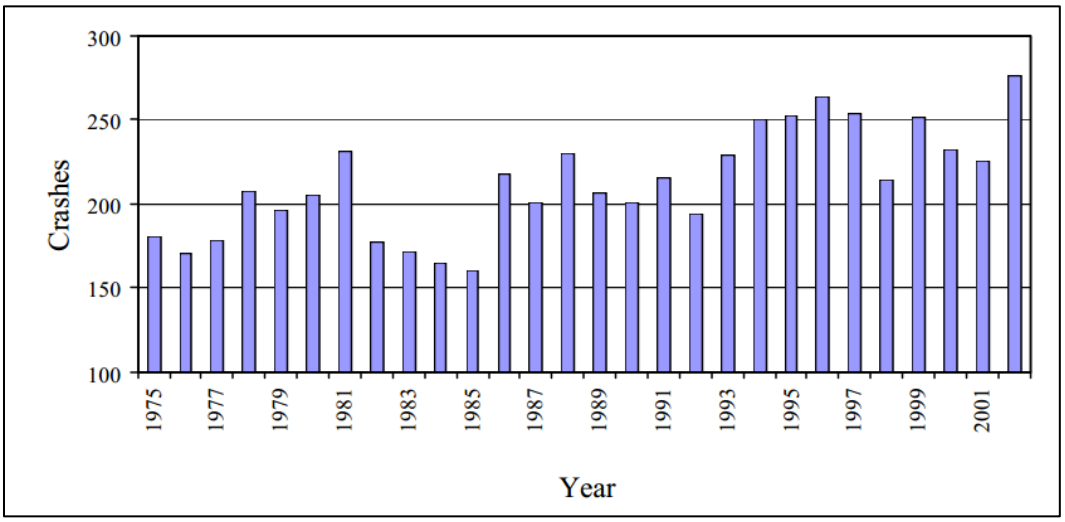
RSAs are a powerful tool that provides objective analysis of the safety of the roadways. They have been successfully utilized on Indian reservations across the U.S. to determine the areas of concern. They have demonstrated the effectiveness of collaboration among the many safety stakeholders involved.

Wyoming has developed the WRRSP to meet the criteria set forth in the HRRRP. They have developed a five-step methodology that utilizes crash data and field evaluation along with a benefit-cost analysis to determine high risk crash locations. They have successfully implemented this program across the state in several counties. This approach can be used for Indian reservations because there are many similarities.

CHAPTER 3. CRASH TRENDS ON INDIAN RESERVATIONS

NATIONAL STATISTICS

The main report cited for crash statistics related to Indian reservations is the Fatal Motor Vehicle Crashes in Indian Reservations 1975-2002, by the National Center for Statistics and Analysis [8]. During that time period, 213 fatal crashes a year occurred on Indian reservations, totaling 5,962 fatal crashes with 7,093 fatalities. Fatal crashes on the average were 187 crashes per year for the first five years (1975-1979) but increased by 29.5 percent for the five most recent years (1998-2002) to 239 crashes per year. See Figure 2 for breakdown by year of fatal crashes on Indian Reservations in the US.

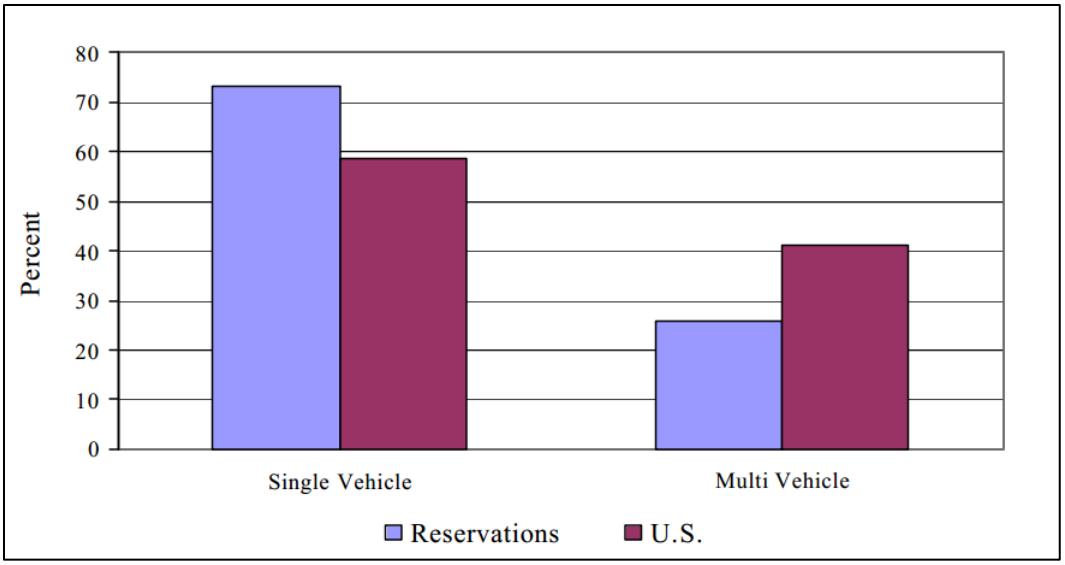


Source: NCSA, NHTSA, FARS 1975-2002

Figure 2. Graph. Fatal Crashes on Indian Reservations 1975-2002.

As previously cited, the number of fatal crashes per year on Indian Reservations increased 52.5 percent (181 fatal crashes in 1975 and 276 fatal crashes in 2002), whereas fatal crashes per year nationally decreased by 2.2 percent over the same time period (39,161 fatal crashes in 1975 and 38,309 fatal crashes in 2002) [8].

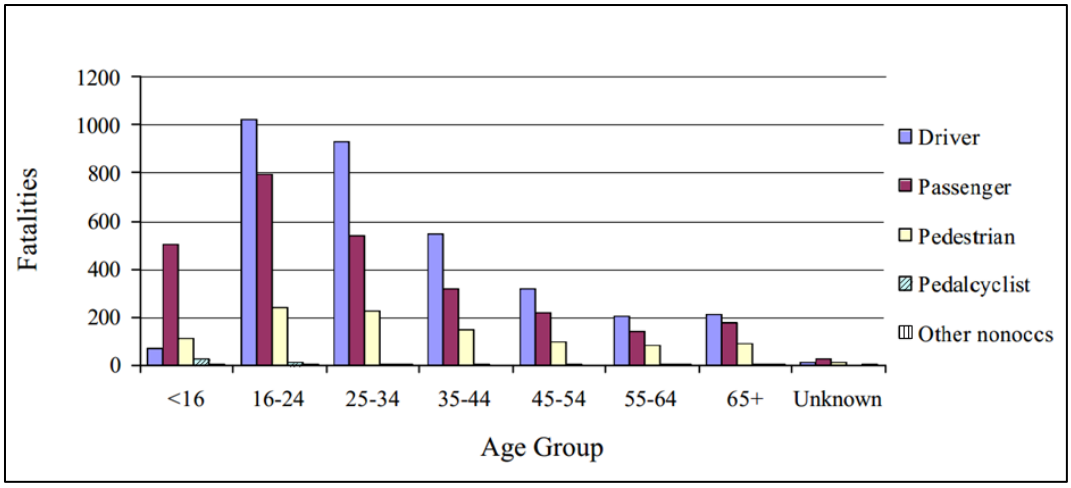
Several characteristics of the fatal crashes on Indian reservations were compared to US statistics in the report. The most significant findings include single vehicle crashes, age, restraint use, speeding and alcohol involvement. On reservations, 73 percent of the fatal crashes were single vehicle where 58 percent of all fatal crashes in the US were single vehicle (Figure 3).



Source: NCSA, NHTSA, FARS 1975-2002

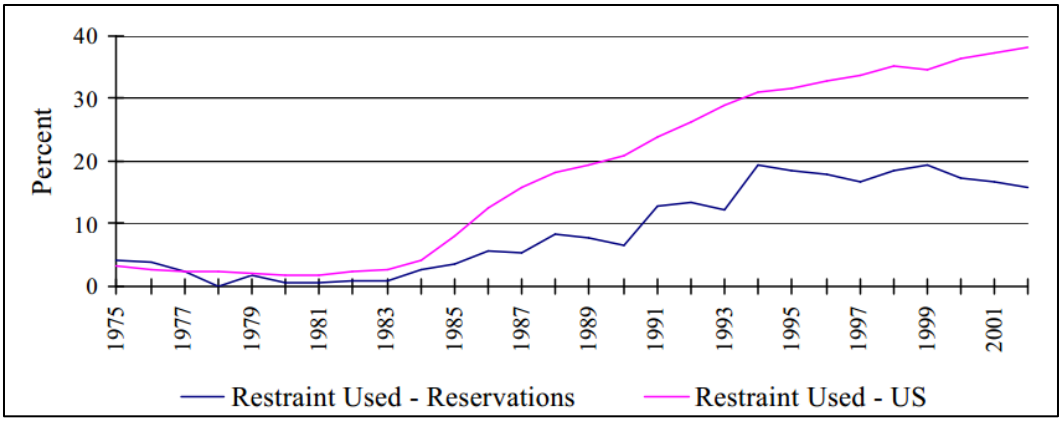
Figure 3. Graph. Fatal Crashes by Crash Type.

Sixty-three (63) percent of the fatalities on reservations were under the age of 35, compared to 57 percent in the nation (Figure 4). On reservations, 76 percent of the fatally injured occupants were unrestrained where 68 percent were unrestrained nationally. As observed in Figure 5, restraint use has increased since 1983 for both US and Indian reservations. However, use continues to increase across the US but leveled off around 1994 on reservations.



Source: NCSA, NHTSA, FARS 1975-2002

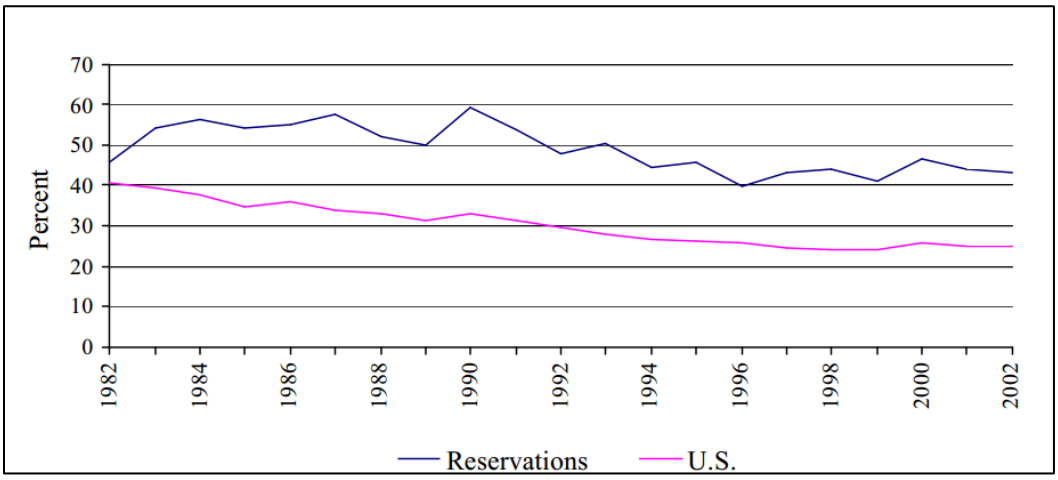
Figure 4. Graph. Crash Fatalities by Person Type and Age on Indian Reservations.



Source: NCSA, NHTSA, FARS 1975-2002

Figure 5. Graph. Fatalities by Restraint Usage for US and Indian Reservations.

Speed related fatalities were also higher on the reservations at 43 percent compared to 35 percent. Finally, 48 percent of drivers had a BAC of 0.01 or more on the reservation compared to 30 percent nationwide. Since 1982, 66 percent of all crash fatalities on reservations were alcohol related (Figure 6).



Source: NCSA, NHTSA, FARS 1975-2002

Figure 6. Graph. Percent Fatalities Driver Alcohol Involvement for U.S. and Reservations

Both the US and Indian reservation statistics showed that 80 percent of the fatal crashes occurred between midnight and 3 am and both trend higher fatalities on Saturday or Sunday at 44 percent for reservations and 36 percent for all fatal crashes in the US.

It should be noted that the report identified that the number of crashes on Indian reservations increased dramatically between 2001 and 2002 at 25 percent, while crashes across the US only increased by one percent. This could be as a result of increased and improved reporting of crashes on reservations. And thus the report recommends further analysis to provide more accurate conclusions.

WIND RIVER INDIAN RESERVATION CRASH ANALYSIS

A preliminary crash analysis was performed by WYT^2/LTAP and compared to statewide local roads and counties of similar size. A similar report presented by the Montana Department of Transportation [33] was utilized in the development of the preliminary analysis. Crash data for the WRIR were analyzed over an eleven year period (2000-2010) and the categories included severity, driver age group, driver gender, first harmful event (FHE), FHE location, safety devices, and driver impairment.

The preliminary analysis revealed several weaknesses with the data. Of the BIA inventory, a total of 245 crashes including county roads were extracted from the database for the eleven year period. Only six roads contained crash data and only 79 crashes were identified with these roads. Crash data on 166 crashes on Indian Reservation Roads (IRR) did not have roadway locations. The low number of reported crashes was determined to be a result of crash reports not being entered into the system. The total number of crashes reported annually for the WRIR dropped sharply after 2006. 36 crashes were reported in 2006, while only 9 were reported in 2010. This indicated that crashes were not being reported properly or somehow not being received by WYDOT.

Efforts among the Tribal transportation personnel, Wind River law enforcement, WYDOT and WYT^2/LTAP have resulted in the inclusion of all crash reports from the WRIR. Through the communications developed in the early meetings, it was discovered that the WRIR law enforcement had crash reports on file for the past several years but lacked the ability to transfer these data to WYDOT. The coordinated efforts resulted in inclusion of the back log of reports into the database.

With the additional crash data added to the WYDOT database, crash analysis was again performed. During the time the data were being added, the crash database system was revised and new data sets were released. These data sets began in 2002 and include data through 2012. The new analysis was performed for the WRIR and compared to the statewide rural local roads and in some cases all crashes statewide, for a ten year period from 2002 through 2011. Although the numbers were greater, the trends were similar to those found in the preliminary analysis. There were a total of 673 crashes reported for the WRIR and 5316 for statewide rural local roads. The following provide a summary of the crash analysis with respect to crash severity, driver information, causal factors, and other factors.

Crash Severity

The severity of crashes is divided into three categories: critical, serious and property damage only (PDO). Critical crashes include fatalities and incapacitating injuries. Serious crashes include non-incapacitating, minor and possible injuries. PDO crashes include those crashes that had no injuries and incurred damage to the vehicle only. As shown in Figure 7, the statewide trend for severe crashes (critical and serious injury) was slightly lower than that for the WRIR at 31 percent and 37 percent respectively. When the statewide and WRIR crashes are compared, the WRIR had more than two times as many critical crashes.

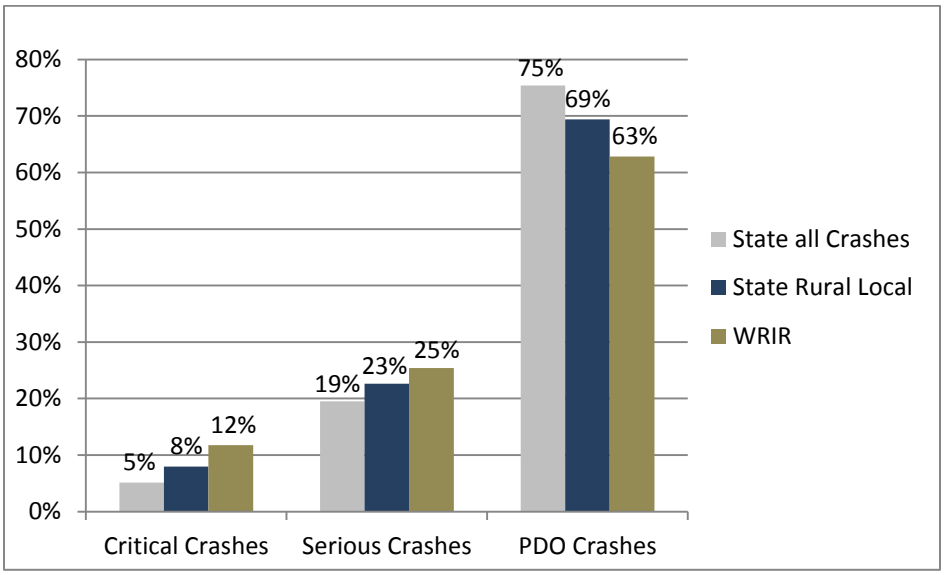


Figure 7. Graph. WRIR Crash Severity 2002-2011.

Driver Information

More women were involved in crashes on the WRIR compared to the state (Figure 8). Young drivers ages 34 and younger are significantly high for both the state and the WRIR (55 percent and 58 percent respectively). However, the WRIR had a greater number of young drivers between the ages of 25 and 34 (Figure 9). Alcohol was involved in a greater number of WRIR crashes compared to the state at 23 percent and 13 percent respectively (Figure 10). When comparing the WRIR to all crashes in the state, alcohol was involved more than three times more on the reservation than the state as a whole.

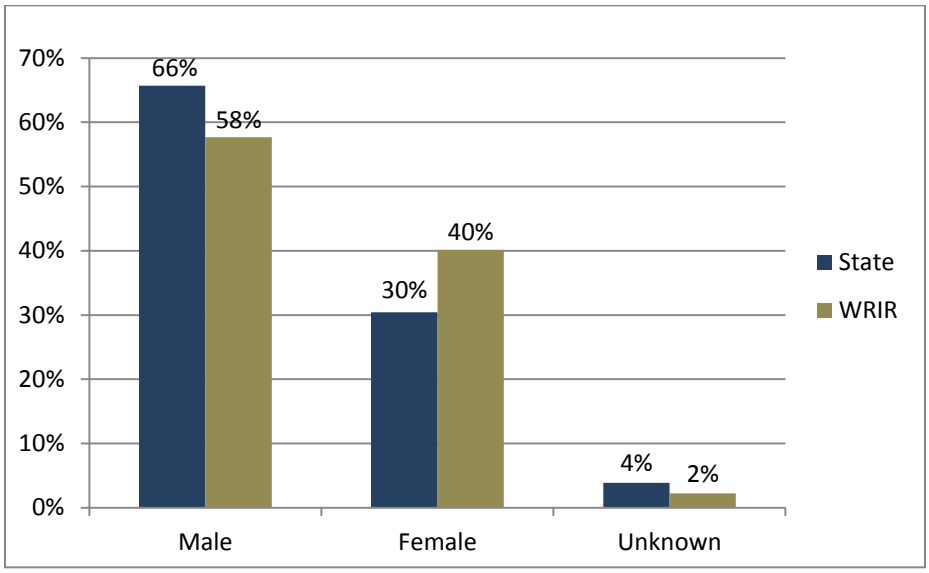


Figure 8. Graph. WRIR Driver Gender 2002-2011.

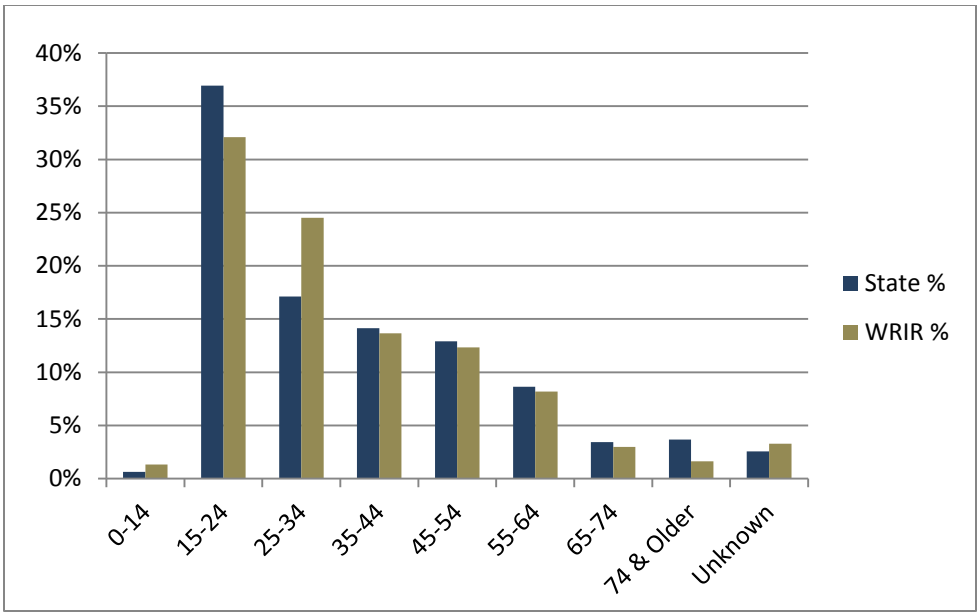


Figure 9. Graph. WRIR Driver Age 2002-2011.

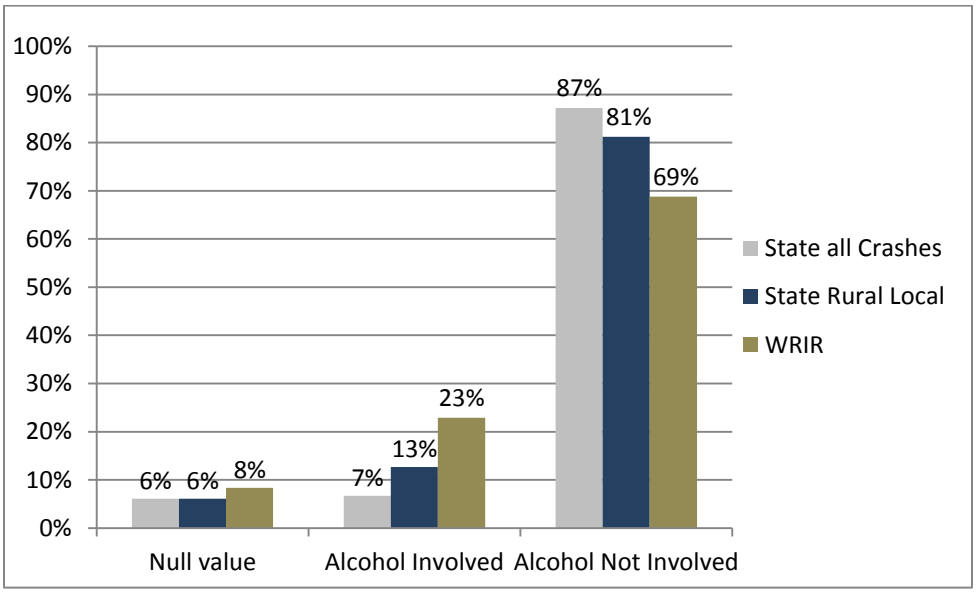


Figure 10. Graph. WRIR Alcohol Involvement 2002-2011.

Causal Factors

The FHE for statewide and WRIR had similar trends with the exception of a significantly greater number of animal collisions at 24 percent for the WRIR compared to 10 percent for the state (Figure 11). When these were broken down by animal type, farm (cows, horses, pigs, etc.), domestic (dogs and others) and wildlife (deer, elk, moose, etc.), over half of the animal crashes on the WRIR involve farm animals (Table 3). Both farm animal and wildlife crashes are a significant problem on the reservation. Finally, The FHE location revealed that the state and WRIR trend the same for on and off-road crashes (Figure 12).

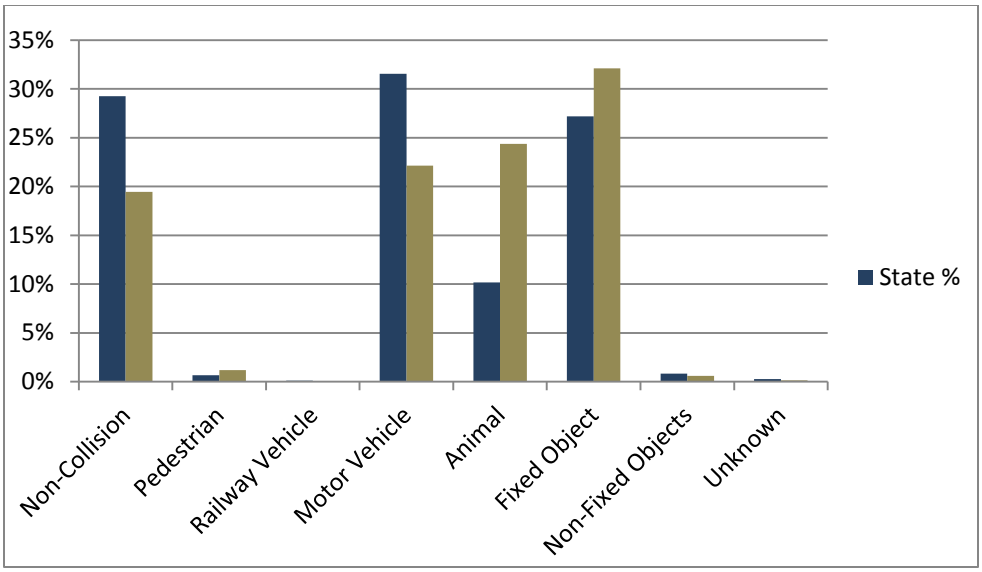


Figure 11. Graph. WRIR First Harmful Event 2002-2011.

Table 3. WRIR Animal Crashes 2002-2011.

FHE Animal Crashes		
Animal Type	State 10% of all crashes	WRIR 24% of all crashes
Farm	37%	55%
Domestic	1%	4%
Wild	62%	41%

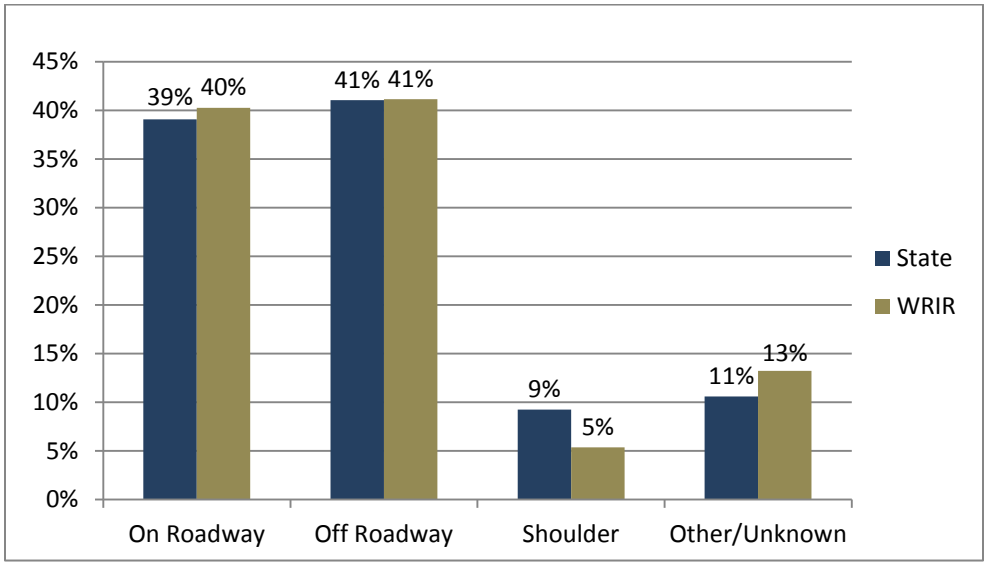


Figure 12. Graph. WRIR FHE Location 2002-2011.

Other Factors

Because of the revisions to the crash data sets described previously, speeding and safety equipment use could not be directly analyzed but should be included in future analysis. However, safety equipment use was analyzed under the preliminary analysis (2000-2010) which revealed that state use was much higher than WRIR at 60 percent compared to 34 percent (Figure 13) but a greater number of crashes on the WRIR had an unknown value for use at 40 percent. As safety equipment use relates to critical crashes, the WRIR had a higher rate of critical crashes for non-use than the state (Figure 14).

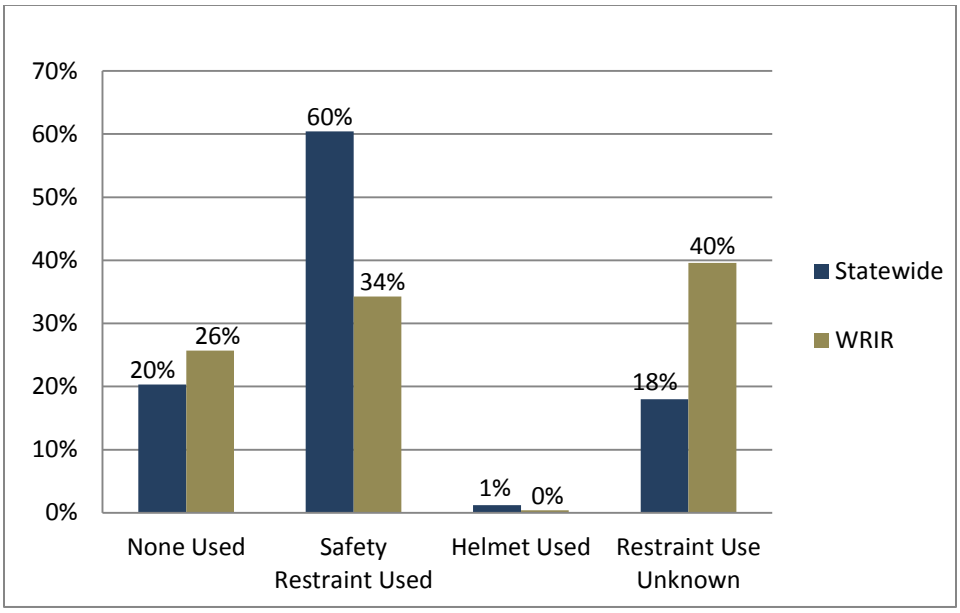


Figure 13. Graph. WRIR Safety Equipment Use 2000-2010.

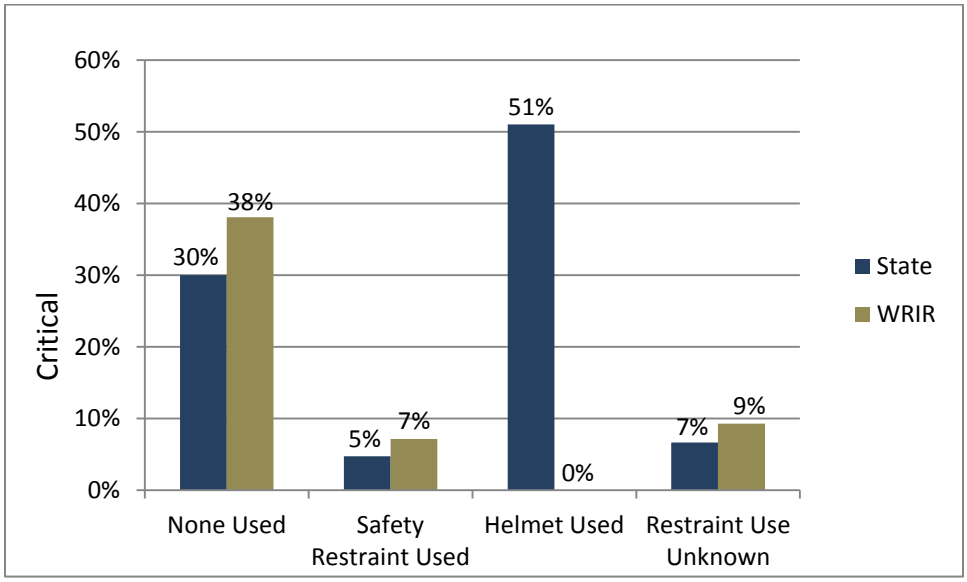


Figure 14. Graph. WRIR Safety Equipment Use Related to Critical Crashes 2000-2010.

The revised analysis also revealed that there were no additional crashes on IRR roads and only county roads within the reservation had locations. This reveals that there is still a disparity with the state crash reporting system and the reservation's ability to capture all crashes in their reporting.

The main issues remain, crash severity is higher on the reservation than throughout the state, alcohol related crashes account for almost a quarter of all crashes, and fixed objects are the highest first harmful event with animals being the greatest risk, and most crashes are occurring off the roadway.

CHAPTER SUMMARY

National statistics of fatal crashes on Indian reservations show that they continue to increase at a high rate but fatal crashes across the U.S. have decreased. Restraint use nationally has increased since the early 1980s for both the U.S. and Indian reservations. However, use has leveled off on Indian reservations since 1994. Alcohol involvement continues to be higher on Indian reservations. A higher rate of fatalities on reservations involved persons under the age of 35.

The analysis performed for the WRIR had similar results with higher severity rates, more people under the age of 35, and alcohol involvement at three times higher on the reservations than across the state of Wyoming. Animal crashes are more than double on the WRIR than the state with most being farm animals. As with national trends, safety equipment use on the WRIR is much lower than that of the state.

The analysis also revealed that crash reporting was deficient. And though collaborative efforts have resulted in the inclusion of many previously unreported crashes, other problems reveal that a disconnect exists with BIA roads not being recognized in the crash database and therefore crash locations are not identified.

CHAPTER 4. INDIAN RESERVATION SAFETY IMPROVEMENT PROGRAM

METHODOLOGY

In this study, the methodology from the WRRSP is used [12] as a template to develop the program for Indian reservations. Depending on available data, preference by the Tribes and other factors this process has been altered to meet the needs of the Tribes. Part of this process includes looking at trends in crash data and developing a systemic approach. A combination of data driven, field verification and trend analysis is utilized. The proposed 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 15. As in the WRRSP methodology, crash data is 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 conditions of the roadway 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 Tribes a measure to prioritize the projects.

This methodology will provide tools for the Tribes to utilize in prioritizing safety improvements. More detail is provided in the following descriptions. Other processes within the methodology are intended to give the Tribes the ability to make changes and identify other factors involved in the high risk locations such as behavioral factors.

Another critical component in the process of identifying safety improvement is evaluation of the effectiveness of those improvements. Once projects have been established, funded and implemented, an after study will be performed to determine the 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 Tribes for consideration for other funding opportunities. The methodology provides flexibility for the Tribes to utilize the results the way they consider best to address.

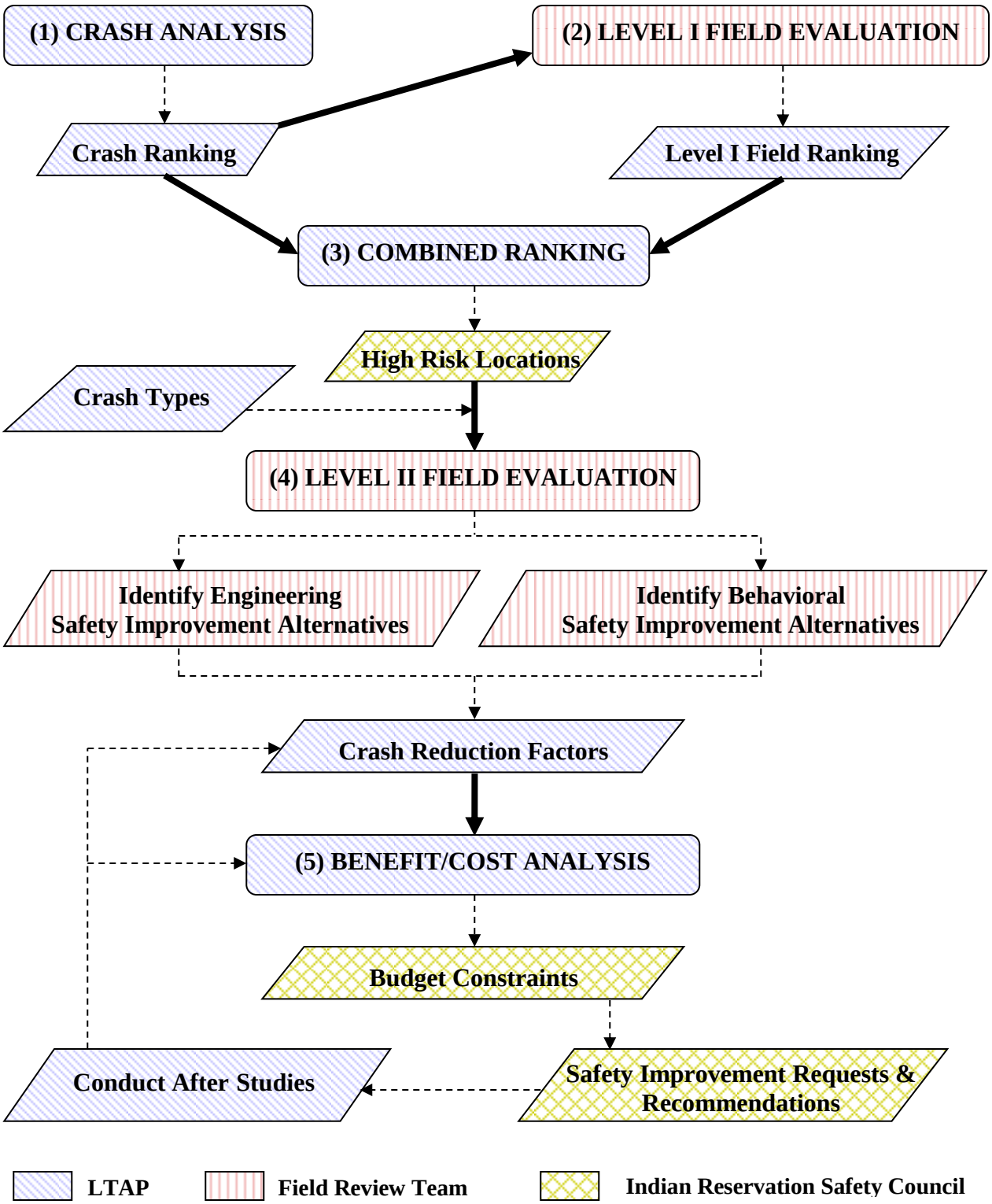


Figure 15. Flowchart. Five Step Process for Indian Reservation Safety Improvement Program.

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 possibly some other state agency or consultant. An analysis should be done for a recent period of time. Five to ten years provides enough data to identify trends or hotspots depending on the state and volume of traffic experienced on the local tribal roads. 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, many times Tribes 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.

Beside 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 – Critical, Serious 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 are being analyzed that are behavioral in nature. The last five criteria are intended more for the behavioral analysis of the crash data. Behavioral improvements will be 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.

A route may appear several times at different mile post segments and some segments may contain the same number of crashes. These are ranked accordingly and the crash rank value assigned would be the same. The next lower number of crashes segment would be assigned the

rank value that corresponds to the line number. An example of ranking the segments according to crash number is located in Table 4.

Table 4. Example of Crash Ranking

Line Number	Route	Mile Post	Number of Crashes	Crash Rank
1	C	2	15	1
2	A	4	14	2
3	D	3	14	2
4	A	6	12	4
5	B	10	9	5

Once the segments have been ranked, then the top routes are selected. The top 15 to 25 routes should be selected for the Level I evaluation as determined by the Tribes.

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. See Figure 16 for an example of scoring the roadway segment. These ratings are applied to five categories as follows:

- General Category. The general category covers the geometrics and condition of the roadway. Conditions such as sharp horizontal curves, poor sight distance at vertical curves, poor pavement quality are looked at for this rating.
- Intersections. The presence of intersections, the number and sight visibility of them are rated.
- Signage and Pavement Markings. The condition or existence of pavement markings and signs are rated.
- Fixed Objects and Clear Zones. The presence of fixed objects and condition of the clear zone is rated.
- Shoulder and Right-of-Way. The quality of the shoulder treatment and adequacy of the right-of-way are rated.

As in the example given in Figure 16, generally the condition was about average but where there was no shoulder, a below average rating of 2 was assigned. 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.

Level I Field Evaluation	Evaluator:	Date:	Page of
Notes:		Road Name:	Road Length: 6.0 miles
		Road No.: A	Road Surface: Asphalt
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage /Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	
0.0 - 1.0	5	7	4	7	2	25	No shoulder
1.1 - 2.0	5	7	4	7	2	25	
2.1 - 3.0	6	7	4	2	2	21	Power pole in clear zone
3.1 - 4.0	6	6	5	7	2	26	
4.1 - 5.0	5	7	5	7	2	26	
5.1 - 6.0	6	7	5	7	2	27	

Figure 16. Example of Level I Field Evaluation Scoring Spreadsheet

Each segment receives a total score as the sum of the score for each category. All segments from all routes that were evaluated 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. Ranking proceeds down the list and if two scores are the same, they receive the same rank. The next rank value would correspond to that line number. Table 5 provides an example of ranking the Level I scores.

Table 5. Example of Level I Ranking

Line Number	Route	Mile Post	Level I Score	Level I Rank
1	A	2	20	1
2	B	4	24	2
3	A	3	25	3
4	C	6	25	3
5	C	10	27	5

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. Table 6 provides an example of how the crash rank and Level I rank are combined.

Table 6. Example of Combining Crash Rank and Level I Rank

Route	Beg MP	End MP	Total Crashes	Crash Rank	Level I Rank	Combined Rank
A	0	1	2	14	15	29
A	1.01	2	4	12	10	22
A	2.01	3	2	14	13	27
A	3.01	4	14	2	1	3
A	4.01	5	12	4	3	7
B	0	1	14	2	2	4
B	1.01	2	8	6	12	18
B	2.01	3	9	5	2	7
C	0	1	9	8	9	17
C	1.01	2	15	1	3	4
D	0	1	3	10	11	21
D	1.01	2	11	2	5	7
E	0	1	1	20	6	26
E	1.01	2	4	8	4	12

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 fifteen roads should be selected for the level II evaluation. Table 7 provides an example of routes selected from the combined ranking.

Table 7. Example of Top Five Roads Selected from Combined Ranking

Route	Total Crashes	Crash Rank	Level I Rank	Combined Rank
A	14	2	1	3
C	15	1	3	4
D	14	2	5	7
B	9	5	2	7
E	4	8	4	12

The rankings along with the selected roads are provided to the Tribes for their review and approval to proceed with the Level II evaluation. The Tribes have the option of including more sites or adjusting the rankings based on their insights.

Level II Field Evaluation

Once the Tribes have 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 Tribes and should include

Tribal personnel and transportation experts. Further data may need to be collected such as traffic counts and review of behavioral factors as well as other causal factors that would 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 assigned. Information on proven safety countermeasures and crash reduction factors can be obtained from the FHWA Safety website [34]. Individual states also may have their own countermeasures and crash reduction factors they have developed. Tribal lands in the state they are located typically have similar conditions unique to that area and thus can utilize those resources of information. Included are behavioral countermeasures that 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, installation of guardrail, 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 marking, and chevrons are effective and low cost.

Each route is evaluated and proposed countermeasures identified. A spreadsheet with typical countermeasures and locations can be used to tabulate these improvements (Figure 17). Each route can be assigned one or more countermeasure.

Jurisdiction:					**Road Name:**						**Route:** D						**Date:**		
Road Class: Rural Local				**ADT:**		**85th Speed:**			**Road Surface:** Asphalt										
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-7	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL																1		
0.1											4	At Bridge		1					Relocate & Replace
0.6							1	West Side											double arrow to end of int.
0.7						6													Double Chevrons (12)
1.0																			
1.0																	1		
1.1			1	West Side															
1.2	↓																		
TOTAL		0	1	0	0	6	1	0	0	0	4	0	0	1	0	0	2	0	
TOTAL SIGNS =			15																

Figure 17. Example Level II Field Evaluation Countermeasures Assigned.

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.

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 Tribes 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 Crash Reduction Factors (CRF) and societal costs of crashes. The crash reduction factor (CRF) is an estimation of the percent reduction of crashes expected from the implementation of the associated countermeasure. This is only an estimate and a general application. Other factors must be considered that apply specifically to the site. The benefit is calculated using the CRF assigned to the particular countermeasure and the cost of that type of crash being avoided (Figure 18). 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 (Figure 19).

$$\begin{aligned} Benefit = \ & (\#PDO\ Crashes\ \times PDOCRF\ \times PDO\ Crash\ Cost) \\ & + (\#Injury\ Crashes\ \times Injury\ CRF\ \times\ Injury\ Crash\ Cost) \\ & + (\#Fatal\ Crashes\ \times Fatal\ CRF\ \times Fatal\ Crash\ Cost) \end{aligned}$$

Figure 18. Equation. Benefit.

$$Combined\ CRF\ = 1\ - [(1\ - CRF1) \times (1 - CRF2) \times \ldots (1 - CRFn)]$$

Figure 19. Equation. Combined CFR.

It is helpful to develop a spreadsheet such as the one used for the implementation on the WRIR to perform the calculations for each countermeasure that are applied to one roadway or project. The ratio of calculated benefit of the countermeasure to the estimated construction cost is then calculated. If any ratio is less than 1.0, it should not be considered because the benefit is actually decreased by the countermeasure. In other words, the countermeasure is increasing the hazard.

Once the benefit-cost analysis is completed for each site, a recommended prioritized list of improvements is provided to the Tribes for their review and approval. Several methods can be employed to identify priorities among the projects such as net present value or an incremental benefit-cost analysis among other prioritization and optimization methods.

When the tribes have decided on 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. Although the new transportation authorization does not specifically mandate the old criteria, the states are still responsible to provide funding for these types of projects.

CHAPTER SUMMARY

This chapter lays out the five-step methodology designed to assist Tribal governments with developing a safety improvement program. Understanding that Tribes have unique challenges and cultural differences, collaboration between their members, government agencies and other safety stakeholders is key to successfully implementing such programs. Starting with a review of crash data provides the trends that are 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. The field evaluation provides a scoring of the locations based on the roadway conditions. These locations are then ranked according to the worst condition to best. Then the crash rank and the Level I field evaluation rank are combined, providing a new list of priority locations.

The whole 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 should be considered as well such as culvert widening and guardrail installation. 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 small investment of funds, there is a potential for a great reduction in fatal and injury crashes.

The following chapter discusses this methodology in detail, applying it to the Wind River Indian Reservation.

CHAPTER 5. IMPLEMENTATION

WIND RIVER INDIAN RESERVATION

The methodology herein described was implemented on the Wind River Indian Reservation (WRIR). This report provides insight to the challenges and opportunities that exist for Indian reservations in implementing a traffic safety improvement program. It provides the opportunity to test the applicability and identify any modification necessary to provide a process useful to tribes across the country.

The WRIR consists of the Eastern Shoshone and Northern Arapaho Tribes who operate their own transportation program and contract with the Bureau of Indian Affairs (BIA) for some transportation functions [(35)]. The reservation has a land area of approximately 2.2 million acres which encompasses about one third of Fremont County and one fifth of Hot Springs County. The Wind River 2011 Road Inventory Summary lists a total BIA inventory of 1,227.8 miles of roadway, of which 174.7 miles is paved. Like many other Tribal governments, they work with limited resources to manage and maintain their roadway system. Many of the county roads (over 400 miles) are jointly maintained by WRIR transportation and the County Road and Bridge Department. The state maintains roughly 200 miles of U.S. and state highways on the reservation.

The transportation director of the WRIR has worked extensively to coordinate with various government agencies to access funding and resources available to improve the WRIR roadway safety. Efforts between the WRIR transportation authorities, WYDOT and WYT^2/LTAP became more focused in the fall of 2011 when meetings were held to develop a safety improvement program for high risk crash locations on the reservation. From this several efforts were launched between the agencies to further develop the WRIR safety program.

The first step in developing a methodology appropriate for Indian reservations is communication and coordination with the Tribes. Several meetings were held between the transportation officials from the WRIR, WYDOT, Northern Plains Tribal Technical Assistance (NPTTAP), WYT^2/LTAP, BIA and Wind River law enforcement. These meetings proved productive and established the necessary protocols to proceed. Early meetings opened the lines of communication and identified what the expectations are from all parties. The WRIR is eager to expand their capabilities to address transportation safety on the reservation and have since extended the scope of the collaboration to the development of a strategic transportation safety plan.

The methodology previously described was presented at these meetings. Feedback was provided by the reservation and their consultants. WRIR transportation personnel identified the need to include behavioral safety improvements. They also agreed that the field evaluation teams needed to include various Tribal stakeholders. Responsibilities were further defined to include the appropriate stakeholders in the process. The methodology flowchart in Figure 15 reflects the input from the Tribes that fosters the collaborative effort needed for the success of the program.

Three areas of responsibility were assigned to the process. WYT^2/LTAP, a Field Review Team and a Tribal Safety Council would be formed to carry out the responsibilities. WYT^2/LTAP was responsible for performing the crash analysis, crash ranking, Level I field ranking, combined ranking, identify crash types, determined accident reduction factors, perform the benefit/cost analysis and will conduct the after studies. The field review team was selected by the Tribes to include WYT^2/LTAP, Tribal transportation and their consultant and, as needed, Tribal law enforcement. This team was responsible for conducting the Level I and Level II field evaluations and identify engineering and behavioral safety improvement alternatives. A Tribal safety council was not formally organized but consists of coordination of program status and review of field results by Tribal transportation officials and their coordination with the Tribal leadership for their input and concurrence. The Tribal safety council's involvement begins with input on the high risk locations and completes the project review by identifying budget constraints and determining what safety improvement projects they desire to recommend and request the appropriate funding.

APPLIED METHODOLOGY

Once the described methodology was reviewed and approved by the WRIR tribal transportation director, plans were made to proceed with the implementation of the methodology. WYT^2/LTAP prepared the crash data and coordinated the efforts between the different agencies. Through the implementation, IRR roads were not recognized initially for improvements because of the lack of crash locations. The methodology was revised for IRR roads based on feedback from the Tribes and a systemic approach was used to address safety improvements on these roads. See Figure 20.

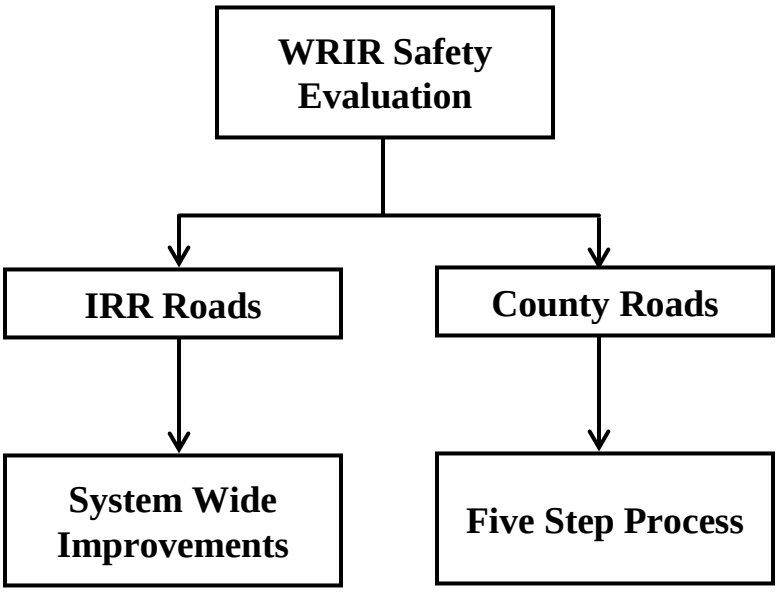


Figure 20. Revised Methodology for IRR Roads

WRIR Crash Data

The analysis of crash data is the first steps in the roadway safety program methodology. Safety goals and strategies are driven by data that documents the safety problems. Many factors must be reviewed to determine appropriate safety measures and the four E's of safety must be considered.

The analysis and subsequent ranking proceeded using the above described crash analysis. The crash analysis database only produced crash locations on county roads on the reservation. As discussed previously, a discrepancy exists with the ability of the system to identify IRR crash locations because of state inventory does not include them yet. The inventory is what links the crash data to a location. This was brought to the attention of the Tribal transportation personnel and discussions concluded to proceed with the county roads and IRR roads simultaneously to try to reconcile at a later date.

The road segments were then sorted by the highest number of crashes per one-mile segment. Ranking was assigned starting at the number one (1). Progressing through the list, equal scores received equal rank. However, the next rank number would be that associated with the total number of segments so far ranked. The ranking can be observed in Table 8.

The top 24 roads were then selected for Level I field evaluation and included roads that had three (3) or more crashes per one-mile segment. Seventeen Mile Road has some of the highest number of crashes per mile but was removed from the ranking since a TIGER grant roadway improvement construction project for this road had only recently been approved and was about to start construction. The roads ranked by crashes are listed in Table 9.

Table 8. County Road Crash Ranking on WRIR.

Row No.	County Route	IRR Route	Road Name	Beg MP	End MP	Total Crashes	Crash Rank
1	54	169	Riverview Road	2.01	3	18	1
2	54	169	Riverview Road	7.01	8	12	2
3	385	385	Eight Mile Road	5.01	6	12	2
4	54	169	Riverview Road	4.01	5	9	4
5	320	132	Burma Road	0	1	9	4
6	346	72	South Fork Road	0	1	9	4
7	320	132	Burma Road	5.01	6	8	7
8	335	52	Ethete Road	0	1	8	7
9	385	385	Eight Mile Road	1.01	2	8	7
10	385	385	Eight Mile Road	4.01	5	8	7
11	320	132	Burma Road	1.01	2	7	11
12	320	132	Burma Road	4.01	5	7	11
13	335	52	Ethete Road	1.01	2	7	11
14	54	169	Riverview Road	3.01	4	6	14
15	54	169	Riverview Road	6.01	7	6	14
16	315	315	Paradise Valley Road	4.01	5	6	14
17	320	132	Burma Road	3.01	4	6	14
18	335	52	Ethete Road	5.01	6	6	14
19	345	B029	North Fork Road	3.01	4	6	14
20	385	385	Eight Mile Road	2.01	3	6	14
21	54	169	Riverview Road	5.01	6	5	21
22	272	141	Hutchinson Road	0	1	5	21
23	345	B029	North Fork Road	2.01	3	5	21
24	346	72	South Fork Road	2.01	3	5	21
25	367	367	Pingetzer Road	0	1	5	21
26	12	CO12	Williams Road	1.01	2	4	26
27	54	169	Riverview Road	1.01	2	4	26
28	320	132	Burma Road	2.01	3	4	26
29	335	52	Ethete Road	3.01	4	4	26
30	335	52	Ethete Road	4.01	5	4	26
31	335	52	Ethete Road	6.01	7	4	26
32	345	B029	North Fork Road	1.01	2	4	26
33	360	162	Country Acres Road	1.01	2	4	26
34	385	385	Eight Mile Road	7.01	8	4	26
35	480	170	Kinnear Spur Road	1.01	2	4	26
36	496		Zuber Road	0	1	4	26
37	273		Cliff Drive	0	1	3	37
38	315	315	Paradise Valley Road	0	1	3	37
39	333	333	Elkhorn Drive	0	1	3	37

Table 9. County Road High Risk Crash Locations on WRIR.

Rank	WYDOT Route	County Route	Road Name	Total Crashes	Max Hot Spot	Fatalities	Injuries	Length (miles)	Crash Rate/ Mile
1	ML5716	54	Riverview	67	18	3	32	23	2.9
2	ML5827	334	Seventeen Mile	105	12	11	84	13	8.1
3	ML5849	385	Eight Mile	48	12	1	17	10	4.8
4	ML5813	320	Burma	45	9	1	27	9	5.0
5	ML5836	345	North Fork	19	6	1	20	6	3.2
6	ML5837	346	South Fork	18	9	0	20	5	3.6
7	ML5828	335	Ethete	40	8	2	26	10	4.0
8	ML5807	315	Paradise Valley	22	6	0	8	11	2.0
9	ML5875	428	North Pavillion	7	5	0	3	7	1.0
10	ML5783	272	Hutchinson	6	5	0	1	2	3.0
11	ML5848	367	Pingetzer	5	5	0	5	1	5.0
12	ML5916	496	Zuber	5	4	0	1	2	2.5
13	ML5838	347	Trout Creek	8	4	1	5	4	2.0
14	ML5844	360	Country Acres	5	4	0	6	2	2.5
15	ML5891	463	Peterson	6	4	0	0	4	1.5
16	ML5902	480	Kinnear Spur	7	4	0	2	2	3.5
17	ML5784	273	Cliff Drive	4	4	0	0	2	2.0
18	ML5825	333	Elkhorn Drive	4	4	0	2	2	2.0
19	ML5876	430	Bass Lake	18	3	1	4	12	1.5
20	ML5822	300	East Pavillion	6	3	0	2	5	1.2
21	ML6216	1	Owl Creek	7	3	0	4	15	0.5
22	ML5823	331	Buckhorn Flats	5	3	0	1	7	0.7
23	ML5831	339	Two Valley	7	3	0	8	6	1.2
24	ML5697	12	Williams	5	3	0	4	2	2.5

Additionally, a GIS map was produced showing the crash locations and indicated them by Fatal, Injury or PDO crashes. Refer to Appendix 1 to observe. The map was a useful tool to capture the magnitude of the crashes and observe the patterns of where the crashes were occurring.

WRIR Level I Field Evaluation

After consultation with the tribes, each of the 24 roads selected were evaluated in one-mile segments. Five categories were evaluated, general roadway conditions, intersections, signage and pavement markings, fixed objects and clear zone, and shoulder and right-of-way.

The same criterion that was used to score the segments in the WRRSP was used for the WRIR. This is because these efforts will be coordinated with the state and counties to provide consistency in collaborative efforts to implement improvements. 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 five categories were evaluated based on the following criteria:

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 Rail Road 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.

The spreadsheets developed for each roadway for Level I can be observed in Appendix 2. This process is very subjective. The evaluating team consisted of three individuals. One member from WYT^2/LTAP, one Tribal transportation member and one BIA engineering consultant comprised the team which was selected by the Tribes. Each individual evaluated each roadway and the values were combined and averaged. By performing all roads together with the same individuals, relative results would be produced which are sufficient to providing a field verification of crash results.

This process was repeated for each segment of each roadway that was selected from the crash ranking. Each roadway ranged from one mile to up to 23 miles long. Field decisions were made by WRIR 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.

Once evaluation of all the roads was complete, the segment scores were tabulated. The combined score for each segment was assigned and the segments were sorted from lowest to highest score. From this, ranking was assigned starting at the number one (1). Progressing through the list, equal scores received equal rank. The next rank number would then be that associated with the total number of segments ranked so far. Table 10 summarizes the level I ranking.

Table 10. County Road Level I Ranking on WRIR.

Row No.	County Route	Road Name	Beg MP	End MP	Total Crashes	Level I Score	Level I Rank
1	273	Cliff Drive	0.0	1.0	3	18	1
2	335	Ethete Road	5.01	6.0	6	20	2
3	335	Ethete Road	7.01	8.0	2	20	2
4	339	Two Valley Road	2.01	3.0	0	21	4
5	347	Trout Creek Road	3.01	4.0	2	21	4
6	335	Ethete Road	8.01	9.0	1	22	6
7	347	Trout Creek Road	0.0	1.0	1	23	7
8	347	Trout Creek Road	1.01	2.0	2	23	7
9	331	Buckhorn Flats Road	1.01	2.0	0	24	9
10	335	Ethete Road	6.01	7.0	4	24	9
11	335	Ethete Road	9.01	10.0	1	24	9
12	345	North Fork Road	5.01	6.0	1	24	9
13	346	South Fork Road	2.01	3.0	5	24	9
14	480	Kinnear Spur Road	0.0	1.0	3	24	9
15	345	North Fork Road	4.01	5.0	1	25	15
16	463	Peterson Road	0.0	1.0	2	25	15
17	463	Peterson Road	1.01	2.0	2	25	15
18	463	Peterson Road	2.01	3.0	1	25	15
19	480	Kinnear Spur Road	1.01	2.0	4	25	15
20	1	Owl Creek Road	2.01	3.0	0	26	20
21	1	Owl Creek Road	3.01	4.0	2	26	20
22	330	East Pavillion Road	1.01	2.0	2	26	20
23	339	Two Valley Road	4.01	5.0	2	26	20
24	345	North Fork Road	0.0	1.0	2	26	20
25	345	North Fork Road	2.01	3.0	5	26	20
26	346	South Fork Road	3.01	4.0	1	26	20
27	347	Trout Creek Road	2.01	3.0	3	26	20
28	1	Owl Creek Road	4.01	5.0	1	27	28
29	1	Owl Creek Road	5.01	6.0	2	27	28
30	1	Owl Creek Road	6.01	7.0	0	27	28
31	54	Riverview Road	6.01	7.0	6	27	28
32	272	Hutchinson Road	0.0	1.0	5	27	28
33	315	Paradise Valley Road	9.01	10.0	2	27	28
34	345	North Fork Road	1.01	2.0	4	27	28
35	367	Pingetzer Road	0.0	1.0	5	27	28
36	463	Peterson Road	3.01	4.0	1	27	28
37	54	Riverview Road	2.01	3.0	18	28	37
38	54	Riverview Road	5.01	6.0	5	28	37
39	339	Two Valley Road	0.0	1.0	1	28	37

Combining the Crash Ranking and the Level 1 Ranking

With a list of all the segments ranked by highest number crashes and lowest Level I score, the two rankings were combined. This was done by sorting each route and adding the respective ranks for the respective segment. Appendix 3 provides the combined ranking for all roadway segments.

Once these were all totaled, then 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 11 is a list of the top twelve roads with their respective combined ranking.

Table 11. County Roads Selected for Level II Evaluation on WRIR.

County Route	Road Name	Beg MP	End MP	Crash Rank	Level 1 Rank	Combined Rank
335	Ethete Road	5.01	6.0	14	2	16
346	South Fork Road	2.01	3.0	21	9	30
54	Riverview Road	2.01	3.0	1	37	38
273	Cliff Drive	0.0	1.0	37	1	38
345	North Fork Road	2.01	3.0	21	20	41
480	Kinnear Spur Road	1.01	2.0	26	15	41
272	Hutchinson Road	0.0	1.0	21	28	49
367	Pingetzer Road	0.0	1.0	21	28	49
347	Trout Creek Road	3.01	4.0	47	4	51
320	Burma Road	0.0	1.0	4	50	54
463	Peterson Road	0.0	1.0	47	15	62
385	Eight Mile Road	1.01	2.0	7	57	64

WRIR Level II Field Evaluation

Twelve roads were selected by the team from the 24 based on the combined ranking to be evaluated for countermeasures. WRIR transportation reviewed the list and agreed to proceed with the Level II evaluation of these roads. At this time the WRIR transportation director requested that 16 IRR roads be evaluated as well for safety improvements. These roads were identified by WRIR as having several crashes and known fatalities. As previously noted, the crash data did not provide locations for the crashes on these roads but did identify that crashes had occurred on IRR roads. Therefore, a similar evaluation was proposed for the 16 IRR roads identified by WRIR transportation.

Each selected road was reviewed as a whole, with the hot spots identified. Many of the countermeasures are site specific and would be applied to these hot spot locations. Other countermeasures would include pavement marking, vegetation clearing or other improvement that would be applied to an entire portion of roadway. Based on the Level I evaluation and crash data, countermeasures were identified for each road. This was a collaborative exercise that entailed making decisions as a team on what can and should be done for the various locations.

A spreadsheet was set up for each roadway that included standard countermeasures, typically signs, and was broken in the tenth of a mile segments. As each road was driven and possible improvements were identified, these were recorded on the spread sheet. A spreadsheet for each road was created and all possible improvements identified. This was accomplished for each of the twelve county roads and the 16 IRR roads. See Appendix 4.

Many of the countermeasures included pavement marking and signage. Several roads are narrow with no shoulder and steep slopes. Future long term improvements would include rebuilding these roads. These types of projects would require acquiring right-of-way and major reconstruction. These types of improvements are not within the scope of the High Risk Rural Road Program designed to provide funding for low cost improvements. However, several were noted and were provided to the tribes for future consideration and pursuit of other funding sources.

WRIR Benefit-Cost Analysis

Once the safety improvements were identified, WYT^2/LTAP proceeded with the benefit-cost analysis. Based on countermeasures provided by FHWA in their Desktop Reference for Crash Reduction Factors [27], the improvements were matched with the countermeasures and Crash Reduction Factors (CRF) were assigned. The countermeasures and their respective reduction factors are listed in Table 12.

Table 12. Countermeasures and Respective CRFs used for WRIR Safety Improvements.

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 edgelines, 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 (see equation, Figure 21). 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 5 years, the current construction cost would be two times the cost of one application.

$$Cost = \frac{10\ years}{service\ life} \times Present\ Cost$$

Figure 21. Equation. Cost Adjustment to Service Life.

Cost estimates were developed based on WYDOT 2011 bid tabs and WYT^2/LTAP resources from other similar safety improvements and were categorized by the selected countermeasures. The total cost was calculated for each road and compared to an overall benefit in crash reduction

for the entire roadway. This was done for each county and IRR road. Table 13 and Table 14 contain the results of the initial estimates developed for the county and IRR roads.

The benefit-cost analysis proceeded for the county roads. Since the calculated benefit is based on the number and severity of crashes at a location, this analysis could not proceed for the specified IRR roads. However, as the evaluations have demonstrated, the IRR roads and county roads had similar conditions. The results of the benefit-cost analysis could be assumed to be similar for the IRR roads as the county roads.

Table 13. WRIR County Roads Safety Improvement Estimates.

WRIR County Roads Safety Improvements by Project Type						
Project Type	Ethete	South Fork	Riverview	Cliff*	North Fork	Kinnear Spur
Signs	$10,800	$6,400	$4,400	$2,400	$6,800	$4,100
Pavement Marking	$0	$0	$4,224	$0	$6,825	$0
Trans. Rumble Strip	$500	$0	$0	$0	$0	$0
Clear Vegetation	$0	$0	$0	$0	$5,550	$0
Guard Rail	$0	$18,000	$0	$0	$0	$0
Hazard Flashers	$0	$0	$25,000	$0	$0	$0
Extend Culvert	$3,750	$0	$0	$0	$0	$0
Total	$15,050	$24,400	$33,624	$2,400	$19,175	$4,100
Project Type	Hutchinson	Pingetzer*	Trout Creek	Burma	Peterson*	Eight Mile
Signs	$1,800	$3,100	$8,500	$400	$5,200	$2,400
Pavement Marking	$0	$0	$5,280	$6,336	$0	$0
Trans. Rumble Strip	$0	$0	$0	$0	$0	$500
Clear Vegetation	$0	$0	$0	$0	$3,000	$150
Guard Rail	$0	$0	$0	$0	$0	$0
Hazard Flashers	$0	$0	$0	$0	$0	$0
Extend Culvert	$0	$0	$0	$0	$0	$0
Total	$1,800	$3,100	$13,780	$6,736	$8,200	$3,050

*Unpaved

Table 14. WRIR IRR Roads Safety Improvement Estimates.

WRIR IRR Roads Safety Improvements by Project Type								
Project Type	Cemetery	Stuart*	Old WR Hwy	Dead Horse	Yellow Calf	Shipton	Thunder	Trosper
Signs	$1,200	$6,900	$2,800	$4,400	$1,200	$3,200	$1,600	$1,200
Pavement Marking	$0	$0	$3,168	$0	$0	$0	$0	$0
Trans. Rumble Strip	$0	$0	$0	$0	$0	$0	$0	$500
Clear Vegetation	$0	$0	$0	$0	$0	$0	$500	$0
Guard Rail	$0	$0	$0	$0	$0	$0	$0	$0
Total	$1,200	$6,900	$5,968	$4,400	$1,200	$3,200	$2,100	$1,700
Project Type	Mill Creek	Gibbons	Little WR	LH Ditch	C'Hare	Goes In Lodge	St Clair Spur	Shoyo
Signs	$1,600	$2,400	$2,000	$5,300	$2,800	$5,600	$2,800	$4,000
Pavement Marking	$2,957	$2,323	$3,168	$0	$4,435	$0	$0	$0
Trans. Rumble Strip	$0	$0	$0	$500	$0	$500	$0	$0
Clear Vegetation	$0	$0	$0	$0	$0	$0	$13,464	$0
Guard Rail	$0	$0	$0	$63,000	$0	$0	$0	$0
Total	$4,557	$4,723	$5,168	$68,800	$7,235	$6,100	$16,264	$4,000

*Stuart Road is unpaved for 0.5 mile

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 used for this analysis are those used by WYT^2/LTAP for all safety improvements across the state of Wyoming and were obtained from WYDOT. The following table lists these values (Table 15).

Table 15. Societal Crash Costs

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

The benefit is equal to the sum of the number of each crash type that is recorded for that roadway multiplied by its respective societal crash cost and crash reduction factor (Figure 22). For a combined CFR for the site, the CRF are multiplied to produce a combined value that is included

in the benefit equation for the respective crash type (Figure 23). Benefit-cost analysis spreadsheets for the county roads are located in Appendix 5.

$$\begin{aligned} Benefit = \ & (\#PDO\ Crashes\ \times PDOCRF\ \times PDO\ Crash\ Cost) \\ & + (\#Injury\ Crashes\ \times Injury\ CRF\ \times\ Injury\ Crash\ Cost) \\ & + (\#Fatal\ Crashes\ \times Fatal\ CRF\ \times Fatal\ Crash\ Cost) \end{aligned}$$

Figure 22. Equation. Benefit.

$$Combined\ CRF\ = 1\ - [(1\ - CRF1) \times (1 - CRF2) \times \ldots (1 - CRFn)]$$

Figure 23. Equation. Combined CFR.

The ratio of benefit to cost was then calculated. Values less than 1.0 would indicate that there is no benefit in the improvement and the project should be eliminated. None of the roads fell into this category. The roads had a ratio ranging from 2.0 to as high as 399.46. These higher values were surprising since typically benefit-cost ratios are usually between one and one-hundred. A closer look at the roads over 100 reveals that many of the improvements are very low cost but the benefit of the lives saved and injuries prevented is extremely significant. See Table 16 for these results.

Table 16. WRIR Benefit-Cost Analysis Results on County Roads.

Road	Benefit	Cost	B/C Ratio
Eight Mile Road	$2,962,691	$7,417	399.46
Riverview Road	$7,155,772	$44,360	161.31
Ethete Road	$2,657,358	$27,017	98.36
North Fork Road	$3,585,894	$36,863	97.28
Trout Creek Road	$2,421,742	$30,900	78.37
Burma Road	$1,262,850	$16,640	75.89
South Fork Road	$1,117,816	$31,600	35.37
Pingetzer Road	$145,392	$7,750	18.76
Hutchinson Road	$57,600	$3,400	16.94
Kinnear Spur Road	$130,447	$8,100	16.10
Cliff Road	$14,281	$5,600	2.55
Peterson Road	$29,137	$14,600	2.00

IRR Roads

As discussed previously, the crashes on IRR roads had no specific locations and they were analyzed separately to identify trends. Crash severity is higher on the reservation than throughout the state and fixed objects are the highest first harmful event with most crashes occurring off the roadway. The analysis showed that the crashes with animals accounted for 19% of the crashes, fixed objects were 31% and non-collision were 23% for the First Harmful Event (FHE). For the FHE location, 68% were off the roadway. These trends indicate that run-off-the-road crashes are prevalent on the IRR roads and animals and fixed objects in the clear zone are the greatest risk. Of the 166 crashes that occurred on IRR roads, there were 9 fatalities

and 62 injuries. These statistics warrant further investigation into crash location. These trends will be used in combination with the field evaluation to determine safety improvements. The methodology was revised for this contingency.

For IRR roads or roads without crash locations, the methodology was followed for the field evaluations only and system wide improvements were identified. Figure 20 illustrates the revised methodology used to identify safety improvements on the IRR Roads.

During the Level II field evaluation, the 16 IRR roads selected by the Tribes were similarly evaluated as the county roads. Utilizing the Level I spreadsheet, the IRR roads were driven by the team and given Level I scores per segment. At the same time safety improvements were identified and discussed. These improvements were recorded on the Level II spreadsheet.

These roads can be given a Level I score, but there is no way to tie crash data directly to them. Since these roads are similar in quality as the county roads and based on the Tribe's knowledge of crashes on these roads, a systemic approach to improvements was proposed. Referring back to the crash trends, run-off-the-road crashes were high as were the crashes with fixed objects. Based on the field evaluation, the systemic improvements proposed include improved signage at curves, intersections, bridges, and clearing vegetation in the right-of-way. The following system-wide improvements were proposed to the Tribes (Table 17).

Table 17. Initially Proposed WRIR IRR System-Wide Improvements.

IRR Roads System-Wide Improvements	
Project Type	Cost
Signs	$49,000
Pavement Marking	$16,051
Transverse Rumble Strip	$1,500
Clear Vegetation	$13,964
Guard Rail	$63,000
Total	$143,515

Funded Projects

The projects identified on county roads along with the system-wide improvements for IRR were submitted to the Tribal leadership for review and possible approval for funding request. The WRIR leadership decided to move forward with three system-wide improvements for the IRR roads. They determined that signs, pavement markings and guardrail should be installed on the 16 IRR roads that were reviewed.

The team returned to the field and identified the specific locations that signs should be installed or replaced. The roads that needed pavement markings were identified and miles measured. And finally, their transportation staff and consultants provided locations for guard rail installation. The WYT^2/LTAP provided technical assistance to the Tribes to develop the cost estimates and submit funding requests to WYDOT. The final system-wide improvement projects are listed in Table 18.

Table 18. Final WRIR System-Wide Improvements on IRR Roads.

IRR Roads System-Wide Improvements	
Project	Cost
Signs	$140,114
Pavement Marking	$125,539
Guard Rail	$14,815
Total	$280,468

With help from WYT^2/LTAP, WRIR submitted applications to WYDOT for the low-cost safety improvements. Since these were system-wide improvements, no benefit-cost analysis was performed. The Tribal joint business council approved the projects for submittal and provided a resolution to the state authorizing the Tribal match of funds. WRIR intends to use their own labor force for the Tribal match.

These applications were considered along with several other applications from counties around the state. The Safety Management System Committee (SMS) approved the projects for submission to the state transportation commission. They in turn approved the projects and WYDOT prepared contracts with the Tribes. A copy of the three applications is included in Appendix 6.

Once the reservation has completed these projects, an analysis of crash data will be performed at least three years after the completion to determine the effectiveness of the countermeasure. The WYT^2/LTAP center will provide technical assistance to the Tribes to perform the needed crash analysis.

CHAPTER SUMMARY

The five step methodology developed through this research was implemented on the WRIR. WYT^2/LTAP worked in collaboration with WRIR transportation personnel and BIA consultants. The methodology was revised for the IRR roads because crash locations could not be established. However, WRIR was aware of fatal and serious injury crashes on the IRR roads and identified 16 roads to review for system-wide safety improvements.

Three system-wide projects were submitted to WYDOT for funding. These included the installation of signage, pavement markings and the installation of guardrail. The projects have been approved by the state and contracts have been issued. WRIR will commence construction in the 2013. WYT^2/LTAP will provide after studies to determine the effectiveness of the improvements.

Coordinated efforts between the WRIR and Fremont County should be pursued to address the needed improvements on the county roads located on the reservation. Fremont County has initiated some improvements on the WRIR but more collaboration is necessary ensure consistent application of safety improvements throughout the reservation.

CHAPTER 6. CRASH REPORTING FOR WRIR

Since crash data is critical to determining high risk locations, it is imperative that remedies be applied to improve crash reporting. There were deficiencies found with the WRIR crash data and alternative measures were taken to overcome this in the initial implementation of the safety improvement program methodology. However, in order to have an effective program, crash reporting must be a priority.

DEFFICIENCIES FOUND

When the methodology was being first implemented on the WRIR, gaps were discovered in the crash reporting. Preliminary crash analysis was performed for an eleven year period from 2000 through 2010 and revealed a total of 245 crashes including county roads with only six roads containing crash data. Of those roads only 79 crashes were identified. 166 crashes were identified as occurring on IRR roads but had no location connected with them. The total number of crashes reported annually for the WRIR dropped sharply after 2006.

This presented at least two problems, several crashes had gone unreported and crashes on IRR roads could not be located. These issues were brought to one of the initial meetings between WRIR, WYDOT, TTAP, and WYT^2/LTAP. BIA law enforcement was also represented and they were able to address the issue with the low crash report numbers.

UNREPORTED CRASHES

The low number of reported crashes was determined to be a result of crash reports not being entered into the system. BIA had no means of submitting crashes into the WYDOT system. They had all of the reports in hard copy files at the reservation.

Efforts among the Tribal transportation personnel, Wind River law enforcement, WYDOT and WYT^2/LTAP have resulted in the inclusion of all crash reports from the WRIR. WYDOT Worked with BIA to provide access to their system so that all future reports could be uploaded directly. WYT^2/LTAP collected the hard copy reports and delivered them to WYDOT. After several months, WYDOT was able to finish the upload of the backlog of reports.

INCOMPATIBLE INVENTORIES

With the additional crash data added to the WYDOT database, crash analysis was again performed. The new analysis was performed for the WRIR for a ten year period from 2002 through 2011. There were a total of 673 crashes reported for the WRIR including IRR and county roads. The identity of where crashes occurred on IRR roads was still not included.

The discrepancy that exists was discussed by WYDOT staff and BIA consultants. The state system does not have the ability to identify IRR crash locations because of they are not included in the state inventory. The BIA has a different numbering system of their routes. Their inventories were kept in spreadsheet form.

However, The BIA has contracted to have the entire roadway inventory transformed into a Geographical Information System (GIS). Once this is completed, base maps can be shared between the WRIR and WYDOT and the routes can be linked to the crash database. WRIR has been working on this system and should have it completed in 2013. Once that is done, WYT^2/LTAP will assist WRIR to get the needed information to WYDOT.

REMAINING CHALLENGES

Many of the gaps in the original WRIR crash reporting have been resolved or are in the process of being so. What remains for WRIR is to be able to retain resources to keep the crash reporting up to date. This may be challenging since the BIA is responsible for law enforcement and they may not always be able to apply the necessary resources. In addition, as turn over occurs in personnel, new people must be trained. This has been a challenge for other Indian reservations.

The WRIR has taken proactive measures to ensure quality data collection and reporting. They understand the need for complete and accurate crash reporting. They have included it as a safety issue emphasis area in their strategic highway safety plan and have developed strategies to address it.

CHAPTER SUMMARY

The deficiency of crash data on the WRIR was due to two problems. One, several crash reports had never been uploaded to the WYDOT data base. This was quickly resolved through coordinated efforts between WYDOT and BIA law enforcement by getting their system connected to WYDOT and the back log of hard copy reports were uploaded.

The second problem with the gaps in crash data is the identification of crash locations on IRR roads. This is due to the conflicting inventories of WRIR and WYDOT. WRIR has hired a consultant to inventory their entire roadway system and have it transformed into a GIS. When this work is complete, the WYDOT crash data base can link to the IRR route numbers.

Follow up with the Tribes needs to occur to ensure that their new inventory is complete. The WRIR inventory and base maps must be obtained and delivered to WYDOT. WYT2/LTAP will follow up with WRIR and deliver the necessary information to WYDOT.

CHAPTER 7. WRIR STRATEGIC HIGHWAY SAFETY PLAN

The FHWA sent out applications in 2011 to all Tribes across the country to participate in a pilot Tribal Transportation Safety Management Program (TSMP). This program was set up by FHWA to assist Tribes with the implementation of a comprehensive safety program in partnership with their involved safety organizations. WYT^2/LTAP provided assistance with the application and the WRIR was selected as one of three pilots.

The WRIR received notification from FHWA in February, 2012 that they were selected to participate in the pilot Tribal TSMP. The kickoff meeting for the development of the TSMP was conducted in April, 2012. FHWA, Tribal leaders, BIA, WYDOT, WYT^2/LTAP and the National Highway Transportation Safety Administration (NHTSA) were among the participants. Although participation was high, some key stakeholders were not present including, law enforcement, emergency and health services, and Fremont County. The meeting proceeded with input from Tribal leadership and transportation personnel on the importance of recognizing safety needs. A vision and mission were established, safety issues were identified, strategies were developed to target the issues, and a partnership agreement was drafted. The following provides an overview of each step.

VISION, MISSION AND GOALS

The Tribal community was very engaged in the process of developing a vision, mission and goals. They understand the problems they face and were decisive in what they want out of this program. The draft vision is to "foster safety awareness and provide safe access throughout the Wind River Indian Reservation for all users and modes of travel". The mission is "to improve and sustain safety for all modes of transportation through education, enforcement, engineering and emergency medical services strategies". Three goals were set for the program:

- Raise awareness of transportation safety challenges to promote a positive change in our safety culture.
- Reduce the emotional and physical burden inflicted upon families because of a fatality or serious injury that occurs on our transportation system.
- Promote non-motorized travel by improving safety, security, and infrastructure.

A common theme that is evident in the vision, mission and goals is the concern for pedestrian safety and one emphasis area is dedicated to the safety of the walking community.

COMMUNICATION, COORDINATION AND COOPERATION

One of the first steps in developing the strategic plan was to identify the many stakeholders and how much communication and coordination has taken place in the past. By identifying these levels of communication, the strengths and weaknesses could be easily identified. The stakeholders were grouped into eight categories:

- Transportation safety advocates which included tribal leadership.

- Traffic engineering/safety professionals.
- Traffic law adjudication professionals.
- Driver education curriculum management.
- Traffic law enforcement professionals.
- Health department professionals.
- Emergency Medical Services (EMS) professionals.
- Other safety stakeholders.

There is strong coordination among the traffic engineering/safety professionals and the safety advocates, the driver education curriculum management and traffic law enforcement professionals. However, very little communication exists between the various groups and the health and EMS professionals. This was evidenced by the lack of participation from these groups in the initial meeting. Subsequent meetings drew more participation from all stakeholders. Also, more cooperation and coordination is needed between the Tribal law enforcement and the state and county counterparts.

IDENTIFICATION OF SAFETY ISSUES AND CONCERNS

The safety stakeholders were asked to identify safety issues and concerns during the initial part of the kickoff meeting. They included such issues as behavioral, roadway, vehicle, weather, non-motorized and others.

Among the many issues and concerns by the WRIR, behavioral safety issues were by far their greatest concern. Speed, restraint use, distracted and impaired driving, underage, unlicensed, and young drivers were the focus of the behavioral issues. These are major concerns that have been identified throughout the Indian nations across the country as previously reported from the National Tribal Transportation Safety Summit [(7)]. As a primary concern, the stakeholders recognized that in order to tackle the behavioral issues, the safety culture must change. This was addressed in the strategies as well as identified as a primary goal of the TSMP.

The other issues identified in the plan are roadway safety, vehicle safety, weather and environmental, non-motorized (bicycle and pedestrian) and other issues which include EMS response and limited resources. Pedestrian safety on their rural roadways is a primary concern because many residents walk. Limited facilities are available and many walk along the rural highways unprotected.

EMPHASIS AREAS AND STRATEGIES

From the above safety issues, specific emphasis areas were identified and strategies were developed to address them. These strategies were grouped into eight emphasis areas:

- Safety data.
- Emergency services.
- Roadway infrastructure.
- Safety restraints.
- Impaired driving.

- Speeding.
- Pedestrians and bicycles.
- Young driver safety.

These focus areas are complimentary to the Wyoming Strategic Highway Safety Plan (WSHSP). Lane departures and curve crashes in the WSHSP is comparable to roadway infrastructure in the WRIR TSMP. Safety equipment, young drivers, speeding, and impaired driving directly correlate with the state strategies. See Table 19 for these comparisons. These strategies are data driven. As discussed previously, with the exception of speeding, crash data analysis supports these emphasis areas (Table 20). However, speeding is a well-documented problem that can be verified through the citation records of law enforcement.

Table 19. Comparison of Strategic Plan Focus Areas.

WYDOT	WRIR
Lane Departure	
Safety Equipment	Safety Equipment
Young Drivers	Young Drivers
Curve Crashes	Roadway Infrastructure
Speeding	Speeding
Impaired Driving	Impaired Driving
	Safety Data
	Emergency Services
	Pedestrian and Bicycles

Table 20. Crash Data Results for Focus Areas.

Focus Areas	WRIR Crashes 2002-2011
Run Off Road/Lane Departure	41%
Use of Safety Restraint*	26%
Alcohol Involved	23%
Speeding/Driving too fast	Not yet analyzed
Young Drivers	33%

* From preliminary analysis for 2000-2010, 40% reported unknown

The goal established for safety data is to improve the completeness and accuracy of safety data to support the decision-making process. There are major discrepancies in the reporting of crashes and strategies are being developed to improve crash reporting. Improving the communication and collaboration among law enforcement is a key element in capturing all crashes. Integration of data through GIS is underway to link roadway, traffic volume and crash data. These elements are identified in the plan.

Improving the quality and efficiency of emergency services is the goal of the second emphasis area, emergency services. Response time has been a major problem for the WRIR. Information

on EMS response times within the WRIR indicates a 40 to 60 minute total response time from the responder location within the highway network to the accidents and then to the medical service provider. Factors which influence this response time are: 1.) Fremont County Fire District is comprised of rural volunteer fire departments and must be summoned by siren and/or pagers to respond for duty, and 2.) The WRIR does not have a fire station house within its boundary. EMS responders come from Fort Washakie, Milford, Kinnear, or Riverton fire stations, which are, at a minimum, 20 miles from the geographic center of the WRIR. The same 20 miles must then be traveled back to either Riverton Memorial Hospital or Lander Medical Center for emergency care/Life Flight services. A 30-minute increase means half that time is wasted on driving. A review and modification of the dispatch protocols is one strategy that will improve this situation. Another strategy that will require greater resources is the addition of medical facilities or dispatch stations.

The goal for the roadway infrastructure is to improve the design and maintenance practices to reduce the frequency and severity of crashes. WYT^2/LTAP has been working on developing a safety improvement program to assist the WRIR to identify and prioritize low cost safety improvements on their roadways. This program, known as the Indian Reservation Roadway Safety Program (IRRSP), is currently underway and initial implementation was completed by 2013. By implementing the IRRSP, many low-cost safety improvements can be identified. Coordination with Fremont County is also necessary to establish maintenance responsibilities and possibly transfer ownership of county roads on the reservation to the WRIR transportation agency. County representatives were not present at the initial meeting.

For the two emphasis areas, safety restraint and impaired driving, changing the safety culture was determined to be the primary strategy to employ to increase restraint use and reduce the prevalence of impaired driving. Educational campaigns are ongoing and will continue that are directed to the Indian community. Media campaigns, targeted enforcement, more education partnering with Injury Prevention Resources, and imposing stronger sentences to offenders in a blitz type manor will begin to impact the cultural attitude of transportation safety.

Reducing speeds to minimize the severity of crashes is the goal of the sixth emphasis area. A review of the existing posted speeds and a comprehensive speed study throughout the reservation will help determine appropriate speeds and identify where traffic calming measures could be employed.

Pedestrian and bicycles are an emphasis area for which strategies are identified to reduce the conflict between these users and vehicles by providing designated facilities. The WRIR has implemented a Pedestrian and Walkway Long Range Transportation Plan. Including it in the strategic plan will help ensure that it will receive the needed attention. Other strategies are identified to achieve the goal for pedestrians and bicyclists which include the addition of crossings, promotion of bike rodeos and education efforts in the schools.

Young driver safety is the last emphasis area with the goal to reduce the prevalence of crashes involving young drivers. As identified from the crash data, 33 percent of all crashes on the reservation between 2001 and 2010 were drivers under the age of 25. Including those under the

age of 35 increases it to 58 percent. Education and enforcement of distracted driving are the main strategies to address this.

ROLES AND RESPONSIBILITIES

In order to carry out the TSMP successfully, roles and responsibilities need to be identified and assigned to the appropriate stakeholders. This is an integral part of coordination and collaboration. The following areas of responsibility were identified:

- Traffic engineering.
- Driver education.
- Law enforcement.
- Fire/emergency medical services.
- Data management.

The traffic engineering partners include the Shoshone and Arapaho Department of Transportation (SADOT), WYT^2/LTAP, TTAP, WYDOT, BIA and consultants. SADOT will obtain and provide traffic, crash and roadway data. WYT^2/LTAP will provide evaluation of high risk locations, BIA will provide technical assistance and consultants will provide engineering services.

The driver education partners include SADOT, WYT^2/LTAP, TTAP, WYDOT, BIA law enforcement, injury prevention resources, school superintendents and children advisory groups. WYT^2/LTAP will provide crash analysis and recommendations for behavioral safety improvements to SADOT and BIA. SADOT and BIA will provide the educational opportunities for drivers. Partners will team with WYDOT as necessary for media and educational campaigns.

Law enforcement partners include the Wind River Police Department (WRPD), WYDOT, local law enforcement, tribal courts, BIA law enforcement, County Coroner and State Highway Patrol. WRPD will provide law enforcement, teaming with WYDOT to improve crash reporting and strengthen partnerships with local law enforcement. Tribal courts will support law enforcement and enforce penalties.

Fire and emergency medical services partners include the Wind River Indian Health Services (WRIHS), Fremont County Fire Department, and first responders. WRIHS and Fremont County Fire Department provide the emergency medical services. The need to improve response time is recognized.

Lastly, the data management partners are SADOT, WYDOT, WRPD, WYT^2/LTAP, BIA law enforcement and the County Coroner. WYDOT manages the crash data. WRPD submits crash data directly to WYDOT and is working to improve the process. WYT^2/LTAP coordinates with BIA and WYDOT to retrieve any records not submitted electronically.

As recognized under the communications section of the TSMP, the roles and responsibilities require great cooperation and collaboration. Many weaknesses were identified in the

communication among the various stakeholders and further development is necessary to ensure the roles and responsibilities are carried out successfully.

NEXT STEPS

A final stakeholders meeting needs to be conducted to finalize the Transportation Safety Plan, finalize and sign the commitment to safety agreement by the Safety Management Committee, and to refine the strategies and priorities within the plan. A copy of the plan is located in Appendix 7.

The benefit of the partnering agreement is the development of lasting relationships and responsibilities. These can last beyond specific personnel that may change jobs or retire and it sets up long-term partnerships by defining roles and responsibilities. The agreement includes the vision, mission and goals of the plan. It identifies the executive committee responsible to commit to the plan and includes all major stakeholders, including the Joint Tribal Business Council. The plan must be reviewed, responsible stakeholders assigned, funding options identified and opportunities to enhance the communication, coordination and cooperation must be sought.

Tremendous progress has been made, but there is still much to do in order to have a functional and effective TSMP. The Tribal community and many of the safety stakeholders are optimistic in being able to carry it out. The greatest challenges are to foster the cooperation and collaboration of all stakeholders and secure the resources necessary to carry it out.

CHAPTER SUMMARY

Strategic Highway Safety Plans are necessary for communities to be able to carry out their safety programs effectively. Tribes often lack the resources and technical expertise to develop a plan that works for them. FHWA sent out applications in 2011 to all Tribes across the country for be a part of a Pilot Tribal TSMP to assist the Tribes in developing such plans. The WRIR was selected as one of three pilots. The many stakeholders involved include Tribal leadership, Local Technical Assistance Program (LTAP), Tribal Technical Assistance Program (TTAP), Bureau of Indian Affairs (BIA), and local and Tribal law enforcement, and Indian Health Services (IHS) and others local partners.

The first step in developing a TSMP is to analyze crash data and identify trends to determine where the problem areas lie. Preliminary analysis revealed that crash data was incomplete. Safety data became one of the focus areas. Crash trends confirmed many of the concerns by the Tribes. The severity of crashes is higher on the reservation than throughout the state. Alcohol, young drivers and safety equipment use are major problem areas.

The Tribal community was resolute in identifying their vision, mission and goals. They envision raising safety awareness and improving the safety of all users of the roadways. Pedestrian are a major concern on their reservation because facilities do not exist and much of the walking happens on the rural highways.

The WRIR stakeholders recognize the importance of good communication and cooperation among them. They identified where the weaknesses are set up and strategies to overcome these barriers. The major safety issues include behavioral, roadway, vehicle, weather, non-motorized and others. Behavioral was recognized as their greatest concern and their goals include strategies to change the safety culture of their people.

CHAPTER 8. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Crash Trends

Fatal and serious injury crashes among Native Americans are significantly higher than those among whites and other races across the United States. Although this is a widely recognized problem, only recently have efforts been made to assist Tribes with traffic safety on their reservations. Reservation roads are typically rural in nature and some of the same concerns that face local governments in reducing fatal and serious injury crashes on their rural roadways are faced by the Tribes. Rural roads have significantly higher fatal crash rates than urban roads because of extreme terrain, higher speeds, higher number of crashes involving alcohol use and longer response time for emergency services and many are run-off-the-road crashes.

Indian Reservation Safety Improvement Program

The objective of this project was to develop a methodology for high risk locations on Indian reservation roads which are typically rural and experience low volumes of traffic. The methodology developed provides a means to address this problem. This methodology is a five-step process of 1) crash analysis, 2) level I field evaluation, 3) combined ranking, 4) level II field evaluation, and 5) benefit-cost analysis. This methodology addresses the rural, local roads issues of lack of resources and the difficulty of identifying high risk locations on low volume roads. It is intended to address the unique needs of Tribal transportation networks. Understanding their lack of resources both in personnel and funding along with working together with the Tribes with respect to their sovereignty is necessary to make a successful program. This project has also looked at the weaknesses in crash data and has identified some of the challenges to overcome to improve crash reporting across jurisdictions of the state and local Tribes. Based on these weaknesses, the methodology is adjusted to identify systematic improvements where crash data is lacking.

Implementation on the Wind River Indian Reservation

The methodology was implemented on the WRIR. Crash data kept by WYDOT was analyzed by WYT^2/LTAP and the top 24 roads were submitted to the WRIR for their concurrence. A team selected by the Tribes performed a Level I field evaluation and the crash and Level I rankings were combined. The same team performed a Level II evaluation and identified countermeasures for low cost improvements on 12 roads. WYT^2/LTAP calculated the benefit-to-cost analysis. None of the roads had a benefit-to-cost ratio less than one. Two of the roads had benefit-to-cost ratios over 100. This is an indication that small improvements on these rural roads have a significant impact on the number of fatal and serious injury crashes.

The application of this methodology revealed that significant collaboration is necessary to the success of a safety improvement program for Tribes. Because of their sovereignty and the several agencies involved in delivering a successful traffic safety program, flexibility needs to be

provided for the Tribes to make adjustments to the process to fit their unique operations to have a methodology that makes sense and will work for them. A program that fits their specific needs can make the task of safety improvement manageable for the Tribes as well as encourage them. They can realize effective results and be in a position to make better informed decisions on allocating funds for safety improvements. The methodology provides for the Tribal leadership to give input throughout the process and make the final decisions on safety improvement projects.

The case study also revealed and confirmed many weaknesses that have been identified for years. The lack of crash data and the accuracy prompted immediate collaboration to resolve. Continued efforts are necessary to improve and maintain good data. With the lack of crash data, the methodology can be adjusted to address high risk location on a systemic basis. Looking at trends together with field verification of roadway conditions, logical countermeasures can be applied system-wide. Depending on the degree of crash information, some level of benefit-to-cost analysis may be applied on a system-wide level and should be further studied.

Coordination and collaboration is critical to the success of these programs. The state DOTs, LTAP and TTAP centers have expertise that is accessible for the Tribes. Other agencies including FHWA, BIA and law enforcement are key stakeholders that contribute to the success. Many of these groups can help facilitate communication and cooperation between the local government and the Tribes. The FHWA, state DOTs, LTAP, TTAP, BIA and Tribal leadership should continue to pursue relationships and combine expertise and resources to advance traffic safety on Tribal lands. Tribes are recognizing the need for safety improvements and their lack of resources to follow through on many solutions. The combined efforts will assist them with fulfilling the goal of reducing fatal and serious injury crashes on their roadways. A methodology as presented in this report can be adapted to the individual needs of Tribes across the United States with these collaborative efforts.

WRIR Strategic Highway Safety Plan

Reducing fatal and serious injury crashes is a primary transportation safety goal for the federal, state, local, and Tribal governments. There has been extensive research and data collected on the higher crash fatality rates among American Indians on Tribal lands. Although efforts have been made to assist Tribes with improving roadway safety on reservations, they have not been to the level needed to realize significant decrease in fatal and serious injuries. As sovereign nations, they face different challenges than a typical American community. However, there are many similarities in the crash statistics between rural local roads and tribal roads. Crash trends on Indian reservations indicate that speeding, impaired driving and safety equipment use are the highest concerns among American Indians.

A strategic highway safety plan is required of all states and is just as necessary for Tribal governments. Federal Lands Highways under the FHWA has developed an SHSP for Indian Lands that addresses the unique safety concerns for Native Americans. The FHWA has provided a pilot program to invite three tribes across the country to participate in the development of a Tribal TSMP for their roadways. The WRIR was selected for the pilot program and work has progressed on their TSMP. These plans require communication, cooperation and collaboration

of all safety stakeholders. The success of their safety programs is dependent on coordination across jurisdictional lines.

Crash data are essential to the development of a strategic plan to identify the weaknesses and safety issues that are resulting in fatal and injury crashes. Tribal leadership has recognized for some time the lack and incompleteness of crash data. Improving crash data collection and management has become an emphasis area SHSPs for Tribal lands.

The WRIR held several stakeholders meeting and has a TSMP ready for implementation. Strong support from the Tribal leadership as well as many of the safety stakeholders was demonstrated. The group was engaged and extremely focused on developing a vision, mission and goals. Emphasis areas were developed and strategies were identified to address specific issues and concerns. Based on crash data, use of safety equipment, impaired driving and young drivers were targeted for behavioral improvements. The group recognized that the success of implementing behavioral improvements is dependent of successfully changing the safety culture. Pedestrian access is a major concern for the WRIR and they were resolute in including their pedestrian long range plan as an emphasis area to implement and carry it out. Work has been ongoing in improving crash reporting and is an emphasis area in the plan to continue the efforts. The main weakness recognized was some stakeholders were not initially involved and communications need to be improved.

Safety partners working together can make these strategic plans a reality for Tribal governments across the country. The Federal and state governments have extensive resources in expertise and personnel that can facilitate the development of these plans. As states include Tribal lands in their strategic plans, it commits them to a partnership necessary to improve traffic safety on all roadways within their state including those on Tribal lands. Tribal leadership recognizes the safety concerns and the limited resources they have to work with to fulfill their goal of reducing fatal and serious injury crashes; strategic plans are one opportunity to help direct limited resources efficiently to address the identified road safety issues.

RECOMMENDATIONS

Crash Data

Historically crash data is either incomplete or non-existent on Indian reservations. Efforts by state DOTs, BIA, TTAPs, LTAPs, and Tribal leadership need to continue with persistence to reconcile the problems that block good crash reporting. As part of safety reviews and strategic plan development and updates, crash reporting is recommended to be a key topic to address. The individuals and organizations that are responsible for maintaining and reporting crash data should communicate regularly to determine where improvements need to be made.

Great progress has been made with improving crash reporting on the WRIR. Through coordinated efforts between the Tribes, WYDOT, TTAP, and WYT^2/LTAP the discrepancies were identified and improvements made. Continued coordination needs to take place to ensure all improvements to reporting have been applied.

Indian Reservation Safety Improvement Program

This program is recommended for use by Indian Nations across the country. As each state and Tribe relationship is unique, through coordination, communication, and cooperation, a program can be successfully implemented.

Implementation on the WRIR

The initial undertaking of implementing the five-step methodology was extensive and included probably more roads to consider all at once. Either annually or bi-annually, the WRIR is recommended to review their roadway system through this methodology to identify other high risk crash locations and continue requesting funding for improvements.

Once the IRR roads are established in a GIS system, work should proceed to reference them in the WYDOT crash database. This will allow crash analysis for specific locations on IRR roads. The complete five-step methodology could then be utilized and benefit-cost analysis could be included.

WRIR Strategic Highway Safety Plan

This plan needs to be finalized and implemented by the Tribal Safety Council. WYDOT, FHWA, and WYT^2/LTAP are committed to providing continued support to the Tribes to ensure the success of their safety program. Annual stakeholder meetings are recommended to keep the community engaged in the improvement of the roadway safety on the WRIR.

The process that was utilized for the development of this plan is recommended to be applied to Indian Nations across the country. Technical support is accessible to all Tribes through the TTAP centers and other government agencies.

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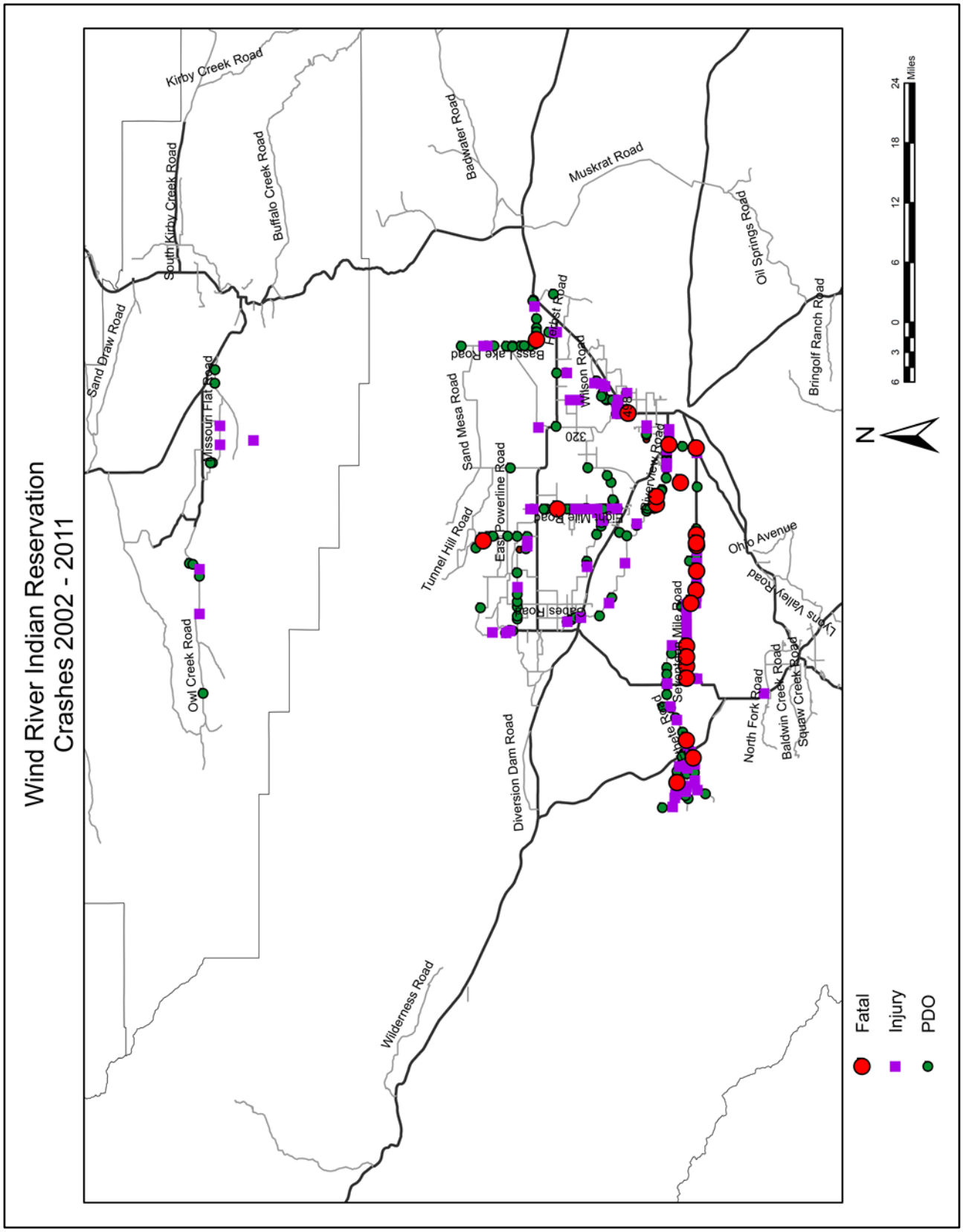
APPENDIX 1: MAP OF WRIR CRASH LOCATIONS ON COUNTY ROADS



APPENDIX 2: WRIR LEVEL I FIELD EVALUATION FORMS

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data.		Road Name: Riverview Road	Road Length:
		Road No.: ML5716 (Co. Rt. 54)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	WRIR Segment Score	Average
0.0 - 1.0	0	0	0	0	0	0	Urban in city limits	0	0	0
1.01 - 2.0	7	7	7	7	6	34	No Crashes Reported	31	31	32
2.01 -3.0	6	5	6	5	7	29	curves, bridge on curve at int.	27	29	28
3.01 - 4.0	7	5	7	7	7	33	several driveways, deer crossing sign	31	32	32
4.01 - 5.0	7	6	6	7	6	32	couple curves not too sharp	29	28	30
5.01 - 6.0	5	7	4	6	5	27	windy	28	28	28
6.01 - 7.0	5	7	5	6	5	28	curvy, cross at curve, drop off at curves	27	25	27
7.01 - 8.0	6	7	6	6	6	31	good super on curve	33	32	32
8.01 - 9.0	5	7	6	7	6	31	long curves	33	33	32
9.01 - 10.0	6	7	6	7	6	32	No Crashes Reported	36	35	34
10.01 - 11.0	6	7	6	7	6	32	No Crashes Reported	36	36	35
11.01 - 12.0	7	7	6	7	6	33	turned off onto Riverview Cut off Road	36	36	35
12.01 - 13.0						0	No Crashes Reported			
13.01 - 14.0						0	No Crashes Reported			
14.01 - 15.0						0	No Crashes Reported			

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data. This road is scheduled for reconstruction within the next two year		Road Name: 17 Mile Road	Road Length:
		Road No.: ML5827 (Co. Rt. 334)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	WRIR Segment Score	Average
0.0 - 1.0	7	8	7	8	7	37	reconstructed first .5 mile, rest to be reconstructed within 2 years	50	44	44
1.01 - 2.0	7	7	6	7	6	33	high speed, high adt	27	28	29
2.01 - 3.0	7	7	7	7	6	34		27	28	30
3.01 - 4.0	6	7	7	7	6	33		27	29	30
4.01 - 5.0	6	7	6	7	6	32		27	26	28
5.01 - 6.0	6	7	5	6	5	29	Curve not marked	27	25	27
6.01 - 7.0	6	7	6	6	4	29	sharp curve, delineators down, ditches	27	23	26
7.01 - 8.0	6	7	6	6	4	29	ditches	27	22	26
8.01 - 9.0	6	7	6	6	4	29		42	21	31
9.01 - 10.0	9	9	9	9	9	45	new construction to end	42	45	44
10.01 - 11.0	9	9	9	9	9	45		42	45	44
11.01 - 12.0	9	9	9	9	9	45	11.9 begin state maintenance	42	45	44
12.01 - 13.0	9	9	9	9	9	45		42	48	45

WRIR Level I Field Evaluation	Evaluator: D. Shinstine	Date: 6/5/12	Page: of
Notes: Combined data.		Road Name: Eight Mile Road	Road Length:
		Road No.: ML5849 (Co. Rt. 385)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	8	7	8	8	7	38	40 mph	26	32
1.01 - 2.0	8	7	8	8	7	38		24	31
2.01 - 3.0	8	7	8	8	7	38		24	31
3.01 - 4.0	8	7	8	8	7	38		24	31
4.01 - 5.0	8	7	8	8	7	38		26	32
5.01 - 6.0	8	8	8	8	7	39		26	33
6.01 - 7.0	8	8	8	8	7	39		26	33
7.01 - 8.0	8	8	8	8	7	39		26	33
8.01 - 9.0	8	8	8	8	7	39		26	33
9.01 - 10.0						0			

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data.		Road Name: Burma Road	Road Length:
		Road No.: ML5813 (Co. Rt. 320)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	6	6	6	5	5	28	several entrances, 35 mph	31	30
1.01 - 2.0	9	9	9	9	9	45	start new construction, 45 mph	34	40
2.01 - 3.0	9	9	9	9	9	45		47	46
3.01 - 4.0	9	9	9	9	9	45		47	46
4.01 - 5.0	8	9	9	9	9	44	sight distance at hill but signed so	47	46
5.01 - 6.0	9	9	9	9	9	45	end new construction	47	46
6.01 - 7.0	7	6	5	6	5	29	speed limit increases to 50 mph	31	30
7.01 - 8.0	7	6	6	7	5	31		33	32
8.01 - 9.0	6	7	7	7	6	33	ends at 8.1		

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data. Intersection needs sign. Need delineators, need speed limit, no guard rail at bridge.		Road Name: North Fork Road	Road Length:
		Road No.: ML5836 (Co. Rt. 354)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	WRIR Segment Score	Average
0.0 - 1.0	7	4	6	5	5	27	fairly urban. 30 mph, poor int, bridge no GR	25	27	26
1.01 - 2.0	7	7	6	5	4	29		26	27	27
2.01 - 3.0	7	7	4	7	4	29	high crash area	26	24	26
3.01 - 4.0	6	7	7	7	4	31		26	27	28
4.01 - 5.0	6	7	7	7	4	31		21	24	25
5.01 - 6.0	5	6	4	6	3	24	poor road surface w/ vegitation encroaching in travelway	24	24	24

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data. No intersection signageNo guardrail at canal.		Road Name: South Fork Road	Road Length:
		Road No.: ML5837 (Co. Rt. 346)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	WRIR Segment Score	Average
0.0 - 1.0	7	7	5	7	5	31		35	30	32
1.01 - 2.0	6	6	6	7	5	30	No shoulder	37	29	32
2.01 - 3.0	6	7	5	3	2	23	Major culvert no GR in curve	24	24	24
3.01 - 4.0	7	7	6	6	3	29	high drop off may warrant GR	27	23	26
4.01 - 5.0						0	Route ends at 3.8			

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data. a lot of pedestrian, a lot of entrances, school, no pvmt markings, no delineators, no intersection signage, open ditch.		Road Name: Ethete Road	Road Length:
		Road No.: ML5828 (Co. Rt. 335)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	WRIR Segment Score	Average
0.0 - 1.0	8	6	7	8	8	37	wide shoulders, reconstructed 5 yrs ago	47	44	43
1.01 - 2.0	8	8	8	8	8	40	1 fatality crossing centerline	48	45	44
2.01 - 3.0	8	8	8	8	8	40		48	45	44
3.01 - 4.0	8	8	8	8	8	40		48	45	44
4.01 - 5.0	8	8	8	8	8	40		48	44	44
5.01 - 6.0	7	4	3	3	3	20	Section evaluated from 5.6 - 6.0 only. First .6 new construction.	23	16	20
6.01 - 7.0	6	6	5	5	4	26	busy int no signs	25	20	24
7.01 - 8.0	5	6	2	6	2	21	90 turns, wrong speed warning sign, drop off at curve	20	20	20
8.01 - 9.0	5	7	2	4	3	21	2 sharp curves	24	21	22
9.01 - 10.0	7	7	5	5	3	27	fairly straight, no shoulders, some drop off	24	22	24
10.01 - 10.5	7	7	6	7	3	30		24	23	26
							verify mile mark direction			

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data.		Road Name: Paradise Valley Road	Road Length:
		Road No.: ML5807 (Co. Rt. 315)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	7	8	8	8	7	38		32	35
1.01 - 2.0	7	8	8	8	7	38		32	35
2.01 - 3.0	7	8	8	8	7	38		32	35
3.01 - 4.0	7	7	8	8	7	37		31	34
4.01 - 5.0	7	7	8	8	7	37		31	34
5.01 - 6.0	7	7	6	8	6	34	curve good super no chevrons	31	33
6.01 - 7.0	7	7	7	7	6	34		30	32
7.01 - 8.0	7	6	6	7	7	33	intersection on curve	30	32
8.01 - 9.0	7	6	6	7	7	33	intersection on curve	32	33
9.01 - 10.0	7	7	5	4	4	27	intersection begin gravel road at 9.0 miles, narrow brig	27	27
10.01 - 11.0	7	8	5	5	5	30		27	29

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data.		Road Name: North Pavillion Road	Road Length:
		Road No.: ML5875 (Co. Rt. 428)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	6	7	6	7	6	32	gravel, some curves	29	31
1.01 - 2.0	6	6	6	7	6	31	cattle guard in curve	29	30
2.01 - 3.0	6	7	6	7	6	32		29	31
3.01 - 4.0						0	drove only first 3 miles	0	0
4.01 - 5.0						0			
5.01 - 6.0						0			
6.01 - 7.0						0			

WRIR Level I Field Evaluation	D. Shinstine	Date: 6/5/12	Page: of
Notes:		Road Name: Hutchison Road	Road Length:
		Road No.: ML5783 (Co. Rt. 272)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	6	5	7	6	6	30		24	27
1.01 - 2.0	6	4	6	6	6	28	90 degree turn	31	30
2.01 - 2.6	7	5	7	6	6	31	misaligned intersection at two valley road, 35 mph	30	31

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data.		Road Name: Pingetzer Road	Road Length:
		Road No.: ML5848 (Co. Rt. 367	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	6	5	5	3	4	23	gravel, cattle guard at .9, end not marked	31	27
								0	0

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data.		Road Name: Zuber Road	Road Length:
		Road No.: ML5916 (Co. Rt. 496)	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	6	7	6		26	sharp curve at beginning, gravel road to stop sign at 0.2 miles then paved
1.01 - 2.0						0	

WRIR Segment Score	Average
35	31
0	0

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data. 2011 fatality not in crash data. Several run off the road crashes at curve.		Road Name: Trout Creek Road	Road Length:
		Road No.: ML5838 (Co. Rt. 347)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	WRIR Segment Score	Average
0.0 - 1.0	7	5	4	4	3	23	min. pvmnt marking, 1" shoulder, fixed objects, steep side slopes	20	25	23
1.01 - 2.0	7	7	5	5	2	26	no shoulder, steep	22	21	23
2.01 - 3.0	7	8	4	5	3	27	chevrons at curve would help	25	25	26
3.01 - 4.0	7	3	4	4	3	21	evidence of several ROR at curve (curve sign present, no chevrons)	19	24	21
4.01 - 5.0	7	7	6	7	4	31		32	33	32

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data.		Road Name: Country Acres Road	Road Length:
		Road No.: ML5844 (Co. Rt. 360)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	7	7	7	5	7	33	40 mph	30	32
1.01 - 2.0	7	7	7	6	6	33	gravel begins at 1.0 at intersection	27	30

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined Data.		Road Name: Peterson Road	Road Length:
		Road No.: ML5891 (Co. Rt. 463)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	6	7	5	6	5	29	gravel, blind curve w/ temp sign "rough Road"	20	25
1.01 - 2.0	6	7	6	5	5	29	Large irrigation ditch adjacent	20	25
2.01 - 3.0	5	6	5	2	3	21	power pole on edge of travel way, irrigation well on edge of travelway	29	25
3.01 - 4.0	7	6	6	4	4	27	narrow bridge	26	27
							ends at 3.6 miles	0	0

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data.		Road Name: Kinnear Spur Road	Road Length:
		Road No.: ML5902 (Co. Rt. 480)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	WRIR Segment Score	Average
0.0 - 1.0	5	6	5	7	6	29	Narrow, 55 mph, no shoulder, sharp curve w/ drop off	24	20	24
1.01 - 2.0	5	6	6	7	5	29		24	21	25

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data.		Road Name: Cliff Drive	Road Length:
		Road No.: ML5784 (Co. Rt. 273)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	4	5	4	3	4	20	gravel, windy, poor sight distance around curves	16	18
1.01 - 2.0						0	ends at 1.0	0	0

Notes: Combined data.

Road Name: Elkhorn Drive	Road Length:
Road No.: ML5825 (Co. Rt. 333)	Road Surface:
Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	6	6	6	5	6	29	gravel and curves	34	32
1.01 - 2.0						0	ends at 1.2	34	34

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data. Roadway surface in poor condition.		Road Name: Bass Lake Road	Road Length:
		Road No.: ML5876 (Co. Rt. 430)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	8	8	8	9	8	41	first .7 mile reconstructed. Posted 45 mph.	40	41
1.01 - 2.0	7	9	8	9	8	41		39	40
2.01 - 3.0	6	9	8	9	8	40		39	40
3.01 - 4.0	6	9	8	9	7	39		35	37
4.01 - 5.0	6	9	8	9	7	39		35	37
5.01 - 6.0	6	9	7	9	8	39		35	37
6.01 - 7.0	6	9	6	9	8	38		35	37
7.01 - 8.0	6	9	6	9	8	38		35	37
8.01 - 9.0	6	9	5	6	8	34		32	33
9.01 - 10.0	6	7	5	5	7	30	end of pavement 9.4	32	36
10.01 - 11.0	7	7	7	7	6	34	No Crashes Reported	30	34
11.01 - 12.0	7	7	8	7	6	35	end 11.2	30	34

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data		Road Name: East Pavillion Road	Road Length:
		Road No.: ML5822 (Co. Rt. 330)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	6	7	7	7	6	33	50 mph, narrow	29	31
1.01 - 2.0	5	7	6	6	6	30	vertical curve no sight distance w/ horizontal curve at top, another vc	21	26
2.01 - 3.0	6	7	7	6	6	32		30	31
3.01 - 4.0	6	7	7	7	6	33		26	30
4.01 - 5.0	6	7	7	6	5	31		27	29
							road ends at 5.5, last .5 miles urban in Pavillion		

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data. Appears that all new signs have been recently installed and probably address the crash problems		Road Name: Owl Creek Road	Road Length:
		Road No.: ML6216 (HS Co. Rt. 1)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	5	7	5	6	6	29	Narrow, no pavement markings	22	26
2.01 - 3.0	6	7	6	6	5	30	No Crashes Reported	22	26
3.01 - 4.0	6	7	6	6	6	31	curve signs	22	27
4.01 - 5.0	6	7	6	6	6	31	chevrons. Power pole at sharp curve	22	27
5.01 - 6.0	6	7	6	7	6	32	sharp curve, with sign and chevrons	22	27
6.01 - 7.0	6	7	6	7	6	32	No Crashes Reported	25	29
7.01 - 8.0	6	7	5	7	6	31	sharp curve no chevrons	27	29
8.01 - 9.0	6	7	5	6	6	30	No Crashes Reported two curves entrance at curve	27	29
9.01 - 10.0						0	No Crashes Reported		
10.01 - 11.0						0	No Crashes Reported		
11.01 - 12.0						0	No Crashes Reported		
12.01 - 13.0						0	No Crashes Reported		
13.01 - 14.0						0	No Crashes Reported		
14.01 - 15.0						0			

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data. Evaluated only first two miles. Crash data begins from 1.01 to 2.0		Road Name: Buckhorn Flats Road	Road Length:
		Road No.: ML5823 (Co. Rt. 331)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	WRIR Segment Score	Average
0.0 - 1.0	6	6	5	6	5	28	No Crashes Reported narrows at .9 mile	26	18	24
1.01 - 2.0	5	5	5	5	4	24	No Crashes Reported	0	0	24
2.01 - 3.0						0	turned to gravel, did not complete			
3.01 - 4.0						0				
4.01 - 5.0						0	No Crashes Reported			
5.01 - 6.0						0				
6.01 - 7.0						0				

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data. North to South, ends at 6.2 at Rt. 26.		Road Name: Two Valley Road	Road Length:
		Road No.: ML5831 (Co. Rt. 339)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	6	5	6	6	5	28	45 mph, narrow, no shoulder	28	28
1.01 - 2.0	6	6	6	6	6	30		26	28
2.01 - 3.0	6	6	3	4	6	25	gravel begins, irrigation ditch at curve w/ no signs or barrier	17	21
3.01 - 4.0	7	7	7	7	7	35	No Crashes Reported	26	31
4.01 - 5.0	6	5	6	5	5	27	pavement at 4.4	24	26
5.01 - 6.0	6	6	6	6	6	30	sharp curve	28	29

WRIR Level I Field Evaluation	Evaluator: LTAP & WRIR	Date: 6/5/12	Page: of
Notes: Combined data		Road Name: Williams Road	Road Length:
		Road No.: ML5697 (Co. Rt. 12)	Road Surface:
		Road Class:	Speed Limit:

Mile Post	General	Intersections / RR Crossings	Signage / Pavement Markings	Fixed Objects/ Clear Zones	Shoulder / ROW	Segment Score	Comments	WRIR Segment Score	Average
0.0 - 1.0	5	7	6	6	6	30	narrow, windy	27	29
1.01 - 2.0	6	7	6	5	6	30		27	29

APPENDIX 3. TABLE. WRIR Combined Ranking for County Roads

County Route	Road Name	Beg MP	End MP	Total Crashes	Crash Rank	Level I Rank	Combined Rank
430	Bass Lake Road	0.0	1.0	2	47	106	153
430	Bass Lake Road	1.01	2.0	1	73	103	176
430	Bass Lake Road	2.01	3.0	2	47	103	150
430	Bass Lake Road	3.01	4.0	2	47	98	145
430	Bass Lake Road	4.01	5.0	3	37	98	135
430	Bass Lake Road	5.01	6.0	1	73	98	171
430	Bass Lake Road	6.01	7.0	1	73	98	171
430	Bass Lake Road	7.01	8.0	1	73	98	171
430	Bass Lake Road	8.01	9.0	1	73	79	152
430	Bass Lake Road	9.01	10.0	3	37	97	134
430	Bass Lake Road	10.01	11.0	0	103	86	189
430	Bass Lake Road	11.01	12.0	1	73	86	159
331	Buckhorn Flats Rd	1.01	2.0	0	103	9	112
320	Burma Road	0.0	1.0	9	4	50	54
320	Burma Road	1.01	2.0	7	11	103	114
320	Burma Road	2.01	3.0	4	26	112	138
320	Burma Road	3.01	4.0	6	14	112	126
320	Burma Road	4.01	5.0	7	11	112	123
320	Burma Road	5.01	6.0	8	7	112	119
320	Burma Road	6.01	7.0	1	73	50	123
320	Burma Road	7.01	8.0	2	47	66	113
273	Cliff Drive	0.0	1.0	3	37	1	38
360	Country Acres Rd	0.0	1.0	1	73	66	139
360	Country Acres Rd	1.01	2.0	4	26	50	76
330	East Pavillion Rd	0.0	1.0	1	73	57	130
330	East Pavillion Rd	1.01	2.0	2	47	20	67
330	East Pavillion Rd	2.01	3.0	2	47	57	104
330	East Pavillion Rd	3.01	4.0	1	73	50	123
330	East Pavillion Rd	4.01	5.0	1	73	42	115
385	Eight Mile Road	0.0	1.0	2	47	66	113
385	Eight Mile Road	1.01	2.0	8	7	57	64
385	Eight Mile Road	2.01	3.0	6	14	57	71
385	Eight Mile Road	3.01	4.0	2	47	57	104
385	Eight Mile Road	4.01	5.0	8	7	66	73
385	Eight Mile Road	5.01	6.0	12	2	79	81
385	Eight Mile Road	6.01	7.0	1	73	79	152
385	Eight Mile Road	7.01	8.0	4	26	79	105

County Route	Road Name	Beg MP	End MP	Total Crashes	Crash Rank	Level I Rank	Combined Rank
385	Eight Mile Road	8.01	9.0	2	47	79	126
333	Elkhorn Drive	0.0	1.0	3	37	66	103
333	Elkhorn Drive	1.01	2.0	1	73	86	159
335	Ethete Road	0.0	1.0	8	7	107	114
335	Ethete Road	1.01	2.0	7	11	108	119
335	Ethete Road	2.01	3.0	3	37	108	145
335	Ethete Road	3.01	4.0	4	26	108	134
335	Ethete Road	4.01	5.0	4	26	108	134
335	Ethete Road	5.01	6.0	6	14	2	16
335	Ethete Road	6.01	7.0	4	26	9	35
335	Ethete Road	7.01	8.0	2	47	2	49
335	Ethete Road	8.01	9.0	1	73	6	79
335	Ethete Road	9.01	10.0	1	73	9	82
272	Hutchinson Road	0.0	1.0	5	21	28	49
272	Hutchinson Road	1.01	2.0	1	73	50	123
480	Kinnear Spur Road	0.0	1.0	3	37	9	46
480	Kinnear Spur Road	1.01	2.0	4	26	15	41
345	North Fork Road	0.0	1.0	2	47	20	67
345	North Fork Road	1.01	2.0	4	26	28	54
345	North Fork Road	2.01	3.0	5	21	20	41
345	North Fork Road	3.01	4.0	6	14	37	51
345	North Fork Road	4.01	5.0	1	73	15	88
345	North Fork Road	5.01	6.0	1	73	9	82
428	North Pavillion Rd	0.0	1.0	3	37	57	94
428	North Pavillion Rd	1.01	2.0	2	47	50	97
428	North Pavillion Rd	2.01	3.0	0	103	57	160
1	Owl Creek Road	2.01	3.0	0	103	20	123
1	Owl Creek Road	3.01	4.0	2	47	20	67
1	Owl Creek Road	4.01	5.0	1	73	28	101
1	Owl Creek Road	5.01	6.0	2	47	28	75
1	Owl Creek Road	6.01	7.0	0	103	28	131
1	Owl Creek Road	7.01	8.0	1	73	42	115
1	Owl Creek Road	8.01	9.0	0	103	42	145
1	Owl Creek Road	9.01	10.0	0	103	42	145
315	Paradise Valley Rd	0.0	1.0	3	37	92	129
315	Paradise Valley Rd	1.01	2.0	1	73	92	165
315	Paradise Valley Rd	2.01	3.0	2	47	92	139
315	Paradise Valley Rd	3.01	4.0	2	47	86	133
315	Paradise Valley Rd	4.01	5.0	6	14	86	100

County Route	Road Name	Beg MP	End MP	Total Crashes	Crash Rank	Level I Rank	Combined Rank
315	Paradise Valley Rd	5.01	6.0	0	103	79	182
315	Paradise Valley Rd	6.01	7.0	2	47	66	113
315	Paradise Valley Rd	7.01	8.0	1	73	66	139
315	Paradise Valley Rd	8.01	9.0	1	73	79	152
315	Paradise Valley Rd	9.01	10.0	2	47	28	75
315	Paradise Valley Rd	10.01	11.0	2	47	42	89
463	Peterson Road	0.0	1.0	2	47	15	62
463	Peterson Road	1.01	2.0	2	47	15	62
463	Peterson Road	2.01	3.0	1	73	15	88
463	Peterson Road	3.01	4.0	1	73	28	101
367	Pingetzer Road	0.0	1.0	5	21	28	49
54	Riverview Road	1.01	2.0	4	26	66	92
54	Riverview Road	2.01	3.0	18	1	37	38
54	Riverview Road	3.01	4.0	6	14	66	80
54	Riverview Road	4.01	5.0	9	4	50	54
54	Riverview Road	5.01	6.0	5	21	37	58
54	Riverview Road	6.01	7.0	6	14	28	42
54	Riverview Road	7.01	8.0	12	2	66	68
54	Riverview Road	8.01	9.0	0	103	66	169
54	Riverview Road	9.01	10.0	0	103	86	189
54	Riverview Road	10.01	11.0	2	47	92	139
54	Riverview Road	11.01	12.0	0	103	92	195
346	South Fork Road	0.0	1.0	9	4	66	70
346	South Fork Road	1.01	2.0	2	47	66	113
346	South Fork Road	2.01	3.0	5	21	9	30
346	South Fork Road	3.01	4.0	1	73	20	93
347	Trout Creek Road	0.0	1.0	1	73	7	80
347	Trout Creek Road	1.01	2.0	2	47	7	54
347	Trout Creek Road	2.01	3.0	3	37	20	57
347	Trout Creek Road	3.01	4.0	2	47	4	51
339	Two Valley Road	0.0	1.0	1	73	37	110
339	Two Valley Road	1.01	2.0	3	37	37	74
339	Two Valley Road	2.01	3.0	0	103	4	107
339	Two Valley Road	3.01	4.0	0	103	57	160
339	Two Valley Road	4.01	5.0	2	47	20	67
339	Two Valley Road	5.01	6.0	1	73	42	115
12	Williams Road	0.0	1.0	1	73	42	115
12	Williams Road	1.01	2.0	4	26	42	68
496	Zuber Road	0.0	1.0	4	26	57	83

APPENDIX 4. WRIR LEVEL II ROADWAY SAFETY IMPROVEMENTS

Wind River Indian Reservation	County: Fremont	Road Name: Ethete Road	County Route: 335	IRR Route: 52	Date: 7/5/12
Road Class: Rural Collector	ADT:	85th Speed:	Road Surface:	Asphalt 0.0 to 10.5	Gravel/natural earth to

LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE LT W1-1 (90°)	CURVE RT W1-1 (90°)	CURVE LT W1-2	CURVE RT W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	COMMENTS
0.0 - 5.6																				Speed and Safety Study
5.6 - 10.5																				Speed and Safety Study
5.61R																				Congested Area Sign
5.6 - 7.0																				Clear Vegitation
5.8R																				School sign
6.1 L																				School sign
5.8R																				School Flashers
6.1 L																				School Flashers
6.0																				Crosswalk at school
6.5R										1										
6.6L										1										
7.4R					1															Replace existing
7.5-7.7								5												Both Directions
7.8L				1																Replace Existing
7.9R					1															Replace Existing
8.0 - 8.2								5												Both directions
8.1L				1																Replace Existing
8.0R																				Extend Culvert south end
8.8R							1													Replace Existing
8.9-9.1								5												Both directions
9.2L						1														Replace Existing
9.6R											1									
9.8L											1									
10.3R										1										Replace existing
10.4R			1																	Replace existing
10.3	1																			Rumble Strips for Stop
0.0-10.5																				Long Term - Wedge Shoulders
TOTAL		0	1	2	2	1	1	15	0	3	2	0	0	0	0	0	0	0	0	

TOTAL SIGNS = 27

Wind River Indian Reservation				County: Fremont			Road Name: South Fork Road						County Route: 346			IRR Route: 72			Date: 7/5/12	
Road Class: Rural Local					ADT:			85th Speed:			Road Surface:		Asphalt 0.0 to 3.7		Gravel/natural earth to					
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE LT W1-1 (90°)	CURVE RT W1-1 (90°)	CURVE LT W1-2	CURVE RT W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	COMMENTS
0.3R																				Curve and Int. with N. Fork
0.5L																				Consider Revising Int. or W1-10
1.3R											1									
1.4L											1									
2.4																				ALT 1: Extend Culvert (8' Dia)
2.4																				ALT 2: GR with Object Markers
0.5R							1													
0.7L							1													
0.6								3												Both Directions
2.9						1				1										
3.7													1							"End County Maintenance" sign
TOTAL		0	0	0	0	1	2	3	0	1	2	0	1	0	0	0	0	0	0	
TOTAL SIGNS =			10																	

Wind River Indian Reservation	**County:** Fremont	**Road Name**: Riverview Road	**County Route:** 54	**IRR Route:** 169	**Date:** 7/5/12
Road Class: Rural Collector	**ADT:**	**85th Speed:**	**Road Surface:** Asphalt 0.0 to 15.0	Gravel/natural earth to	

LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE LT W1-1 (90°)	CURVE RT W1-1 (90°)	CURVE LT W1-2	CURVE RT W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0.0 - 4.0																					Speed and Safety Study
0.0 - 4.1	1																				Re-stripe
0.0 - 3.0																					"Conjested Area"
1.3R											1										
1.4L											1										
2.0R																		1			"Next 10 Miles"
2.2R																				1	"Dangerous Intersection"
2.4L																					Possibly add Flashers
2.4											2										
2.9																				1	Repl. Lft Turn Ln. Sign (M5-1 & M5-4)
3.1											1										
3.6											1										
5.4R						1															
7.00																		1			
2.50																					Long Term: Replace Bridge
TOTAL		0	0	0	0	1	0	0	0	0	6	0	0	0	0	0	0	2	0	2	

TOTAL SIGNS = 11

Wind River Indian Reservation				County: Fremont			Road Name: Cliff Road						County Route: 273			IRR Route:			Date: 7/5/12	
Road Class: Rural local					ADT:			85th Speed:			Road Surface: Asphalt to Gravel/natural earth 0.0 to 1.0									
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE LT W1-1 (90°)	CURVE RT W1-1 (90°)	CURVE LT W1-2	CURVE RT W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	COMMENTS
0.1									1											
0.5													4							GR at Bridge
TOTAL		0	0	0	0	0	0	0	1	0	0	0	4	0	0	0	0	0	0	
TOTAL SIGNS =			5																	

Wind River Indian Reservation	County: Fremont	Road Name: North Fork Road	County Route: 354	IRR Route: BO29	Date: 7/5/12
Road Class: Rural local	ADT:	85th Speed:	Road Surface:	Asphalt 0.0 to 5.8	Gravel/natural earth to

LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE LT W1-1 (90°)	CURVE RT W1-1 (90°)	CURVE LT W1-2	CURVE RT W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0.01	1																			1	Crosswalk & Ped Crossing Sign
0.0 - 5.8	1																				Re-stripe
0.7																					Consider Revising Int. or W1-10
0.8																				1	No Shoulder (W8-23) next 5 miles
1.0R						1															
3.2R											1										
3.5R											1										
3.6L											1										
4.2R								3													Both Directions
4.3L							1														
4.2-4.3	1																				Double Yellow Centerline thru curve
4.9 - 5.6																					Clear vegitation in ROW
5.0													4								At Bridge
5.8																				1	Dead End (W14-1)
5.8																				1	Barricade (Type 3) Red & White
5.8																					Remove pvmnt to gravel sign
0.0 - 5.8																					Long Term - Wedge Shoulders
TOTAL		0	0	0	0	1	1	3	0	0	3	0	4	0	0	0	0	0	0	4	

TOTAL SIGNS = 16

Wind River Indian Reservation	County: Fremont	Road Name: Kinnear Spur Road	County Route: 480	IRR Route: 170	Date: 7/5/12
Road Class: Rural local	ADT:	85th Speed:	Road Surface:	Asphalt 0.0 to 2.4	Gravel/natural earth to

LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE LT W1-1 (90°)	CURVE RT W1-1 (90°)	CURVE LT W1-2	CURVE RT W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0.0 - 2.4																					Speed Study
0.3R						1															
0.9L						1															
0.2 - 0.8								5													Both Directions
0.3L																					Move Stop Ahead Sign
1.2R																					
1.3R						1															
1.4L						1															
1.4																				1	"Blind Curve" Sign
0.0 - 2.4																					Long Term - Widen Shoulders
TOTAL		0	0	0	0	4	0	5	0	0	0	0	0	0	0	0	0	0	0	1	

TOTAL SIGNS = 10

Wind River Indian Reservation				County: Fremont			Road Name: Hutchinson Road						County Route: 272			IRR Route: 141			Date: 7/5/12		
Road Class: Rural local					ADT:			85th Speed:			Road Surface:		Asphalt 0.0 to 2.4		Gravel/natural earth to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE LT W1-1 (90°)	CURVE RT W1-1 (90°)	CURVE LT W1-2	CURVE RT W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0.10			1																		
0.15																					Move Mailbox or breakaway
2.0										2											Both Directions
																					Both Directions
																					Move Stop Ahead Sign
																				1	"Blind Curve" Sign
																					Long Term - Widen Shoulders
TOTAL		0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	
TOTAL SIGNS =			4																		

Wind River Indian Reservation				County: Fremont			Road Name: Pingetzer Road						County Route: 367			IRR Route: 367			Date: 7/5/12		
Road Class: Rural local					ADT:			85th Speed:			Road Surface:		Asphalt to Gravel/natural earth 0.0 to 1.0								
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE LT W1-1 (90°)	CURVE RT W1-1 (90°)	CURVE LT W1-2	CURVE RT W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0.4													4								GR or Delineators
1.0																					Barricade (Type 3) Red & White
1.0													2								For Cattleguard
TOTAL		0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	
TOTAL SIGNS =			6																		

Wind River Indian Reservation	County: Fremont	Road Name: Trout Creek Road	County Route: 354	IRR Route: 25	Date: 7/5/12
Road Class: Rural Collector	ADT:	85th Speed:	Road Surface: Asphalt 0.0 to 5.0	Gravel/natural earth to	

LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE LT W1-1 (90)	CURVE RT W1-1 (90)	CURVE LT W1-2	CURVE RT W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0.0 - 5.0	1																				Re-stripe
0.0 - 2.0																				1	No Shoulder (W8-23) next 2 miles
1.1R										1											
1.2L										1											
1.80																					Clear Vegitation in ROW
2.0R											1										
2.1L											1										
2.6								4													Both Directions
3.3	1							4													Both Directions
4.7																					Curve Sign down
4.8R						1							4								
5.0L						1															
0.0 - 5.0																					Long Term - Wedge Shoulders
TOTAL		0	0	0	0	2	0	8	0	2	2	0	4	0	0	0	0	0	0	1	

TOTAL SIGNS = 19

Wind River Indian Reservation	County: Fremont	Road Name: Burma Road	County Route: 320	IRR Route: 132	Date: 7/5/12
Road Class: Rural local	ADT:	85th Speed:	Road Surface: Asphalt 1.0 to 8.1 Gravel/natural earth to		

LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE LT W1-1 (90°)	CURVE RT W1-1 (90°)	CURVE LT W1-2	CURVE RT W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
1.1 - 5.9	1																				Centerline striping
0.01																				1	Congested Area Sign
7.9L							1														
1.1 - 5.9																					Check County for Overlay Project
1.1 - 5.9																					Long Term - Finish Reconstruction
TOTAL		0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	

TOTAL SIGNS = 2

Wind River Indian Reservation	County: Fremont	Road Name: Peterson Road	County Route: 463	IRR Route: 463	Date: 7/5/12
Road Class: Rural local	ADT:	85th Speed:	Road Surface: Asphalt to Gravel/natural earth 0.0 to 3.6		

LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE LT W1-1 (90°)	CURVE RT W1-1 (90°)	CURVE LT W1-2	CURVE RT W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0.3R						1															
0.6L						1															
0.3L			1																		
0.8																					Extend Culvert
0.8																				1	"Blind Curve" Sign
2.1													1								On Power Pole
2.3													1								On Power Pole
3.5													4								Replace with larger
3.4R																				1	"Narrow Bridge Ahead" (W5-2)
3.6L																				1	"Narrow Bridge Ahead" (W5-2)
3.6R			1																		
0.0 - 3.6																					Clear Vegitation in ROW
TOTAL		0	2	0	0	2	0	0	0	0	0	0	6	0	0	0	0	0	0	3	

TOTAL SIGNS = 13

Wind River Indian Reservation	**County:** Fremont	**Road Name**: Eight Mile Road	**County Route:** 463	**IRR Route:** 385	**Date:** 7/5/12
Road Class: Rural Collector	**ADT:**	**85th Speed:**	**Road Surface:** Asphalt 0.0 to 9.0	Gravel/natural earth to	

LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE LT W1-1 (90°)	CURVE RT W1-1 (90°)	CURVE LT W1-2	CURVE RT W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0.1R																		1		1	"Next 9 Miles"
9.0L																		1		1	"Next 9 Miles"
1.0													4								At Bridge
2.0																					Clear Vegitation in ROW
6.0																					Clear Vegitation in ROW
8.9	1																				Rumble strips at int
TOTAL		0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	2	0	2	

TOTAL SIGNS = 8

Wind River Indian Reservation						Road Name: Cemetary Road					County Route:			IRR Route: 19			Date: 10/18/12		
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:		Asphalt 0.0 to 6.0		Gravel/natural earth to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-7	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0.1	CL		1																Start at intersection with South Fork,
0.1	↓																		South on Cemetary
0.7														1					At Trout Creek
																			Total 1 mile CL
TOTAL		0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
TOTAL SIGNS =			2																

Wind River Indian Reservation					Road Name: Stuart Road						County Route:			IRR Route:			Date: 10/18/12		
Road Class: Rural Local						85th Speed:			Road Surface:		Asphalt 0.8 to 1.3		Gravel/natural earth 0 to 0.5						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-7	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0.1																		1	Dead End
0.4																			
0.5																		2	Narrow Bridge
0.5	CL & EL							2			4								at bridge
1.1					1														Curve Left
1.2			1			4													Double Chevrons (8)
1.3																			
1.3														1					Double arrow at intersection
																			Verify location and direction
																			Paving project in next 2 years
TOTAL		0	1	0	1	4	0	2	0	0	4	0	0	1	0	0	0	3	
TOTAL SIGNS =			16																

Wind River Indian Reservation	Road Name: Old Wind River Highway	County Route:	IRR Route: 27	Date: 10/18/12
Road Class: Rural Local	ADT:	85th Speed:	Road Surface: Asphalt 0.0 to 4.0 Gravel/natural earth to	

LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0.1	CL														1				Start at North Fork Int
1.0-2.0																			
0.2									1	West Side									Curve Left ↖ West Side
0.5					1	West Side			1	East Side									East Side
1.0						5													Double (10)
1.1					1	East Side		1	West Side										Curve Left ↖ East Side
1.2																			Intersection with Trout Creek
1.3			1	East Side					1										
1.3											2								
2.2																			Intersecction with 287
2.2			1	South Side															Transverse Rumple Strip
2.4			1	North Side															Transverse Rumble Strip
2.8																		1	T Intersection W2-4
3.0									1										
3.1			1	East Side															
3.4																			
4.0	↓																		Transverse Rumble Strip
TOTAL		0	4	0	2	5	0	1	4	0	2	0	0	0	1	0	0	1	

TOTAL SIGNS = 20

Wind River Indian Reservation					Road Name: Dead Horse Road						County Route:			IRR Route:			Date: 10/18/12		
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:		Asphalt 0.0 to 1.4		Gravel/natural earth to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-7	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL																		Start at Old Wind River Hwy
0.1					1														Curve Left ↖ South Side
0.3						6													Double Chevrons (12)
1.3			1																
1.4	↓	1												1					Replace Exist. Stop Sign
																			End at Ethete Road
TOTAL		1	1	0	1	6	0	0	0	0	0	0	0	1	0	0	0	0	
TOTAL SIGNS =			10																

Wind River Indian Reservation					Road Name: Yellow Calf Road						County Route:			IRR Route: 38			Date: 7/6/12		
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:		Asphalt 0.0 to 2.7		Gravel/natural earth to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL & EL																		Start at North End
0.6			1					1											
0.8			1																Replace North bound
0.9									1										
2.7	↓																	2	Type III Barricades
																		1	Dead End W14-1
																		1	Ahead W16-9p
																			End at 17 Mile Road
																			*Residential at North End
																			want speed limit
TOTAL		0	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	4	
TOTAL SIGNS =			8																

Wind River Indian Reservation					Road Name: Shipton Road						County Route:			IRR Route: 40			Date: 10/18/12		
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:		Asphalt 0.0 to 1.0		Gravel/natural earth to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL & EL																		Begin at 287
0		1																	Replace Exist.
0.4																			
0.5						6													Double Chevrons (12)
0.6																		1	Add Advisory Speed W13-1p
0.7																		1	Add Advisory Speed W13-1p
1.0	↓																		with exist W1-1 (90)
TOTAL		1	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	2	
TOTAL SIGNS =			9																

Wind River Indian Reservation					Road Name: Thunder Road						County Route:			IRR Route: 33			Date: 7/6/12		
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:		Asphalt 0.0 to 0.7		Gravel/natural earth to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-7	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL & EL																		Begin at Ethete Road
0.1			1											1					Double Arrow at Intersection
0.6											2							1	Dead End W14-1
0.7	↓																	1	Ahead W16-9P
																			Clear debris at culvert
TOTAL		0	1	0	0	0	0	0	0	0	2	0	0	1	0	0	0	2	
TOTAL SIGNS =			6																

Wind River Indian Reservation	Road Name: Trosper Road	County Route:	IRR Route: 16	Date: 7/6/12
Road Class: Rural Local	ADT:	85th Speed:	Road Surface:	Asphalt 0.0 to 2.5 Gravel/natural earth to

LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-7	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL & EL																		Begin at Hwy 132 (Blue Sky Hwy)
0.1																	1	South Side	
0.1			1															1	T Intersection W2-4 North Side
0.5									1										
0.6											4								
0.7									1										
2.4			1																Transverse Rumble Strips*
2.5	↓													1				2	Type 2 Barricade 24 in wide
																			*Verify no residences nearby
TOTAL		0	2	0	0	0	0	0	2	0	4	0	0	1	0	0	1	3	

TOTAL SIGNS = 13

Wind River Indian Reservation					Road Name: Mill Creek Road						County Route:			IRR Route: 21			Date: 7/6/12		
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:		Asphalt 0.0 to 2.8		Gravel/natural earth to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL & EL																		Start at Trosper Road
1.5																			
2.5			1																Replace Exist
2.8	↓																		
TOTAL		0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL SIGNS =			1																

Wind River Indian Reservation					Road Name: Gibbons Road						County Route:			IRR Route: 12			Date: 7/6/12		
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:		Asphalt 0.0 to 2.2		Gravel/natural earth to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL & EL																		
1.2											4								At cattleguard
1.2																		1	Arrow W1-6
1.3																		1	Dead End W14-1
1.3																		1	Ahead W16-9P
2.2																			
TOTAL		0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	3	
TOTAL SIGNS =			7																

Wind River Indian Reservation					Road Name: Little Wind River Road					County Route:			IRR Route:				Date: 7/6/12	
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:	Asphalt 0.0 to 4.6		Gravel/natural earth to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-7	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0														1					Begin at 17 Mile Intersection
0.2											4								At Bridge
0.6						6													Double Chevrons (12)
1.0	CL & EL																		
2.3						6													Double Chevrons (12)
2.5					1	East Side													Curve Right ↗ East Side
2.8					1	West Side													Curve Left ↖ West Side
2.8									1										
3.0									1										
3.8									1										
4.0									1										
4.3						4													Double Chevrons (8)
4.5			1															1	T Intersection W2-4
4.6	↓													1					End at Left Hand Ditch
																		1	*Stop when occupied under Ped sign
																			at school
TOTAL		0	1	0	2	16	0	0	4	0	4	0	0	2	0	0	0	2	
TOTAL SIGNS =			31																

Wind River Indian Reservation					Road Name: Left Hand Ditch Road						County Route:			IRR Route: 8			Date: 7/6/12		
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:		Asphalt 0.0 to 5.5		Gravel/natural earth to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-6	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL													1					Double Arrow at 138 Intersection
0.1																			Tranverse Rumble Strips
0.1			1																- verify residence not in area
0.1																		1	T Intersection W2-4
0.7																		1	Curve Right w/int W1-10
0.7						5													Double Chevrons (10)
0.8									1										
1.0					1				1										Curve Left
1.5						6													Double Chevrons (12)
1.9									1										
2.0									1										
2.3			1					1	At 17 Mile Rd										
2.3																			
3.0					1														Curve Left North Bound
3.3					1														Curve Right South Bound
3.6																		1	Steep Grade W7-1
3.8									1	East side									
4.1									1	West side									
4.3							1	West side											
5.2																			Curve Right East Side
5.2																		1	Dead End
5.5	↓																		*GR at curve (?)
TOTAL		0	2	0	4	11	1	1	6	0	0	0	0	1	0	0	0	4	
TOTAL SIGNS =			30																

Wind River Indian Reservation					Road Name: C'Hare Lane					County Route:			IRR Route: 49			Date: 7/6/12		
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:	Asphalt 0.0 to 1.4	Gravel/natural earth to							
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-7	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL													1					Start at Left Hand Ditch
0.1																		1	T Intersection W2-4
0.8				1														1	Advisory Speed W13-1p
0.9						6													Double chevrons (12)
1.0																		1	Add Advisory Speed W13-1p
1.3			1					1											
1.5	↓																		
TOTAL		0	1	1	0	6	0	1	0	0	0	0	0	0	0	0	0	3	
TOTAL SIGNS =			12																

Wind River Indian Reservation					Road Name: Goes In Lodge Road						County Route:			IRR Route:			Date: 7/6/12		
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:		Asphalt 0.0 to 3.2		Gravel/natural earth to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-7	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL & EL																		Begin at 17 Mile Road
0.1			1	Replace Exist		2								1					Remove Arrow
1.4								1	South Bound										
1.6					1														Curve Right↱ South Bound
1.6																		1	Advisory Speed W13-1p
1.6						6													Double Chevrons (12)
1.8																		1	Add Advisory Speed W13-1p
3.0				1															Curve Right ↱
3.1			1																
3.2						6													Replace existing - Single Chevrons
3.2	↓	1												1					Rumble Strips at curve at 17 Mile Int
																			-verify residence not in area
0.0 - 3.2											16								Power poles in clear zone
TOTAL		1	2	1	1	12	0	1	0	0	16	0	0	2	0	0	0	2	
TOTAL SIGNS =			38																

Wind River Indian Reservation					Road Name: St Clair Spur					County Route:			IRR Route: 4004			Date: 7/6/12		
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:	Asphalt 0.0 to 1.7	Gravel/natural earth	to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-7	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL																		Start at North end
0.1			1	North Side															
0.7					1	West Side			2										Curve Right ↗ West Side
1.0					1	East Side													Curve Left ↖ East Side
1.7	↓													1					
																			Clear vegitation
																			Verify location and direction
TOTAL		0	1	0	2	0	0	0	2	0	0	0	0	1	0	0	0	0	
TOTAL SIGNS =			6																

Wind River Indian Reservation					Road Name: Shoyo Road						County Route:			IRR Route:			Date: 7/6/12		
Road Class: Rural Local				ADT:		85th Speed:			Road Surface:		Asphalt 0.0 to 1.0		Gravel/natural earth to						
LOCATION	PAVEMENT MARKINGS	STOP R1-1	STOP AHEAD W3-1	CURVE W1-1 (90°)	CURVE W1-2	CHEVRON W1-8	WINDING ROAD W1-5	INTERSECTION W2-1	INTERSECTION W2-2 (T)	PAVEMENT ENDS W8-3	OBJECT MARKER OM-3	SPEED LIMIT 20 R2-1	SPEED LIMIT 35 W13-1	ARROW W1-7	ROAD NARROWS W5-1	OPEN RANGE	SHOULDER DROP OFF W8-9A	OTHER SIGN	COMMENTS
0	CL																1		Begin at South Fork Intersection
0.1											4	At Bridge		1					Relocate & Replace
0.6							1	West Side											double arrow to end of int.
0.7						6													Double Chevrons (12)
1.0																			
1.0																	1		
1.1			1	West Side															
1.2	↓																		
TOTAL		0	1	0	0	6	1	0	0	0	4	0	0	1	0	0	2	0	
TOTAL SIGNS =			15																

APPENDIX 5: WRIR BENEFIT COST ANALYSIS SPREADSHEETS

Benefit to Cost (B/C) Ratio Analysis for Safety Improvement

General Information

Analyst	D. Shinstine
Agency/Company	UW
Project	WRIR
Date Performed	7/11/2012

Site Information

Facility	IRR
Road	Burma Road
Analysis Time Period	2001 - 2011
Analysis Year	2012
Segment Length (mi.)	8.1

Inputs

Crash Cost

Fatal	2,500,000
Injury	60,000
Property Damage Only (PDO)	6,000

Number of Crashes				Countermeasures				
Road Segment	*Fatal*	*Injury*	*PDO*	*A*	*B*	*C*	*D*	*E*
Burma Road	1	27	28	1	7			

Calculation

	Countermeasures					
	A	*B*	*C*	*D*	*E*	Combined
Cost	$800.00	$15,840.00				$16,640.00
Benefit	$643,200.00	$729,000.00				$1,262,850.00
B/C Ratio	804.00	46.02				75.89

Benefit to Cost (B/C) Ratio Analysis for Safety Improvement

General Information

Analyst	D. Shinstine
Agency/Company	UW
Project	WRIR
Date Performed	7/11/2012

Site Information

Facility	IRR
Road	Cliff Road
Analysis Time Period	2001 - 2011
Analysis Year	2012
Segment Length (mi.)	1.0 (MP5-6)

Inputs

Crash Cost

Fatal	2,500,000
Injury	60,000
Property Damage Only (PDO)	6,000

Number of Crashes				Countermeasures				
Road Segment	*Fatal*	*Injury*	*PDO*	*A*	*B*	*C*	*D*	*E*
Cliff Road	0	0	4	3	4	5		

Calculation

	Countermeasures					
	A	*B*	*C*	*D*	*E*	Combined
Cost	$800.00	$800.00	$4,000.00			$5,600.00
Benefit	$8,400.00	$7,200.00	$2,640.00			$14,281.20
B/C Ratio	10.50	9.00	0.66			2.55

Benefit to Cost (B/C) Ratio Analysis for Safety Improvement

General Information	
Analyst	D. Shinstine
Agency/Company	UW
Project	WRIR
Date Performed	7/11/2012

Site Information	
Facility	IRR
Road	Eight Mile Road
Analysis Time Period	2001 - 2011
Analysis Year	2012
Segment Length (mi.)	9.0

Inputs

Crash Cost	
Fatal	2,500,000
Injury	60,000
Property Damage Only (PDO)	6,000

	Number of Crashes			Countermeasures				
Road Segment	*Fatal*	*Injury*	*PDO*	*A*	*B*	*C*	*D*	*E*
Eight Mile Road	1	17	37	2	5	22	25	

Calculation

	Countermeasures					
	A	*B*	*C*	*D*	*E*	Combined
Cost	$1,600.00	$4,000.00	$1,666.67	$150.00		$7,416.67
Benefit	$1,496,800.00	$411,620.00	$1,309,700.00	$1,496,800.00		$2,962,691.08
B/C Ratio	935.50	102.91	785.82	9978.67		399.46

Benefit to Cost (B/C) Ratio Analysis for Safety Improvement

General Information

Analyst	D. Shinstine
Agency/Company	UW
Project	WRIR
Date Performed	7/11/2012

Site Information

Facility	IRR	
Road	Ethete Road	
Analysis Time Period	2001 - 2011	
Analysis Year	2012	
Segment Length (mi.)	5.0	Begin at mile mark 5

Inputs

Crash Cost

Fatal	2,500,000
Injury	60,000
Property Damage Only (PDO)	6,000

	Number of Crashes			Countermeasures				
Road Segment	*Fatal*	*Injury*	*PDO*	*A*	*B*	*C*	*D*	*E*
Ethete Road	1	7	9	2	3	4	22	23

Calculation

	Countermeasures					
	A	*B*	*C*	*D*	*E*	Combined
Cost	$4,800.00	$12,000.00	$4,800.00	$1,666.67	$3,750.00	$27,016.67
Benefit	$1,189,600.00	$1,040,900.00	$892,200.00	$1,040,900.00	$1,189,600.00	$2,657,358.22
B/C Ratio	247.83	86.74	185.88	624.54	317.23	98.36

Benefit to Cost (B/C) Ratio Analysis for Safety Improvement

General Information	
Analyst	D. Shinstine
Agency/Company	UW
Project	WRIR
Date Performed	7/11/2012

Site Information	
Facility	IRR
Road	Hutchinson Road
Analysis Time Period	2001 - 2011
Analysis Year	2012
Segment Length (mi.)	2.6

Inputs

Crash Cost

Fatal	2,500,000
Injury	60,000
Property Damage Only (PDO)	6,000

	Number of Crashes			Countermeasures				
Road Segment	*Fatal*	*Injury*	*PDO*	*A*	*B*	*C*	*D*	*E*
Hutchinson Road	0	1	5	2	25			

Calculation

	Countermeasures					
	A	*B*	*C*	*D*	*E*	Combined
Cost	$3,200.00	$200.00				$3,400.00
Benefit	$36,000.00	$36,000.00				$57,600.00
B/C Ratio	11.25	180.00				16.94

Benefit to Cost (B/C) Ratio Analysis for Safety Improvement

General Information	
Analyst	D. Shinstine
Agency/Company	UW
Project	WRIR
Date Performed	7/11/2012

Site Information	
Facility	IRR
Road	Kinnear Spur Road
Analysis Time Period	2001 - 2011
Analysis Year	2012
Segment Length (mi.)	2.4

Inputs

Crash Cost	
Fatal	2,500,000
Injury	60,000
Property Damage Only (PDO)	6,000

	Number of Crashes			Countermeasures				
Road Segment	*Fatal*	*Injury*	*PDO*	*A*	*B*	*C*	*D*	*E*
Kinnear Spur Road	0	2	6	2	3	4	25	

Calculation

	Countermeasures					
	A	*B*	*C*	*D*	*E*	Combined
Cost	$800.00	$4,000.00	$3,200.00	$100.00		$8,100.00
Benefit	$62,400.00	$54,600.00	$46,800.00	$62,400.00		$130,447.20
B/C Ratio	78.00	13.65	14.63	624.00		16.10

Benefit to Cost (B/C) Ratio Analysis for Safety Improvement

General Information	
Analyst	D. Shinstine
Agency/Company	UW
Project	WRIR
Date Performed	7/11/2012

Site Information	
Facility	IRR
Road	North Fork Road
Analysis Time Period	2001 - 2011
Analysis Year	2012
Segment Length (mi.)	5.8

Inputs

Crash Cost

Fatal	2,500,000
Injury	60,000
Property Damage Only (PDO)	6,000

	Number of Crashes			Countermeasures								
Road Segment	*Fatal*	*Injury*	*PDO*	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*
North Fork Road	1	20	9	1	2	3	4	5	7	8	25	29

Calculation

	Countermeasures									
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	Combined
Cost	$2,400.00	$4,000.00	$2,400.00	$1,600.00	$4,000.00	$16,312.50	$0.00	$5,550.00	$600.00	$36,862.50
Benefit	$563,100.00	$1,501,600.00	$1,313,900.00	$1,126,200.00	$412,940.00	$540,000.00	$1,238,820.00	$1,501,600.00	$1,388,980.00	$3,585,893.67
B/C Ratio	234.63	375.40	547.46	703.88	103.24	33.10		270.56	2314.97	97.28

Benefit to Cost (B/C) Ratio Analysis for Safety Improvement

General Information	
Analyst	D. Shinstine
Agency/Company	UW
Project	WRIR
Date Performed	7/11/2012

Site Information	
Facility	IRR
Road	Peterson Road
Analysis Time Period	2001 - 2011
Analysis Year	2012
Segment Length (mi.)	3.6

Inputs

Crash Cost	
Fatal	2,500,000
Injury	60,000
Property Damage Only (PDO)	6,000

	Number of Crashes			Countermeasures				
Road Segment	*Fatal*	*Injury*	*PDO*	*A*	*B*	*C*	*D*	*E*
Peterson Road	0	0	6	1	2	4	5	25

Calculation

	Countermeasures					
	A	*B*	*C*	*D*	*E*	Combined
Cost	$2,400.00	$1,600.00	$1,600.00	$6,000.00	$3,000.00	$14,600.00
Benefit	$5,400.00	$14,400.00	$10,800.00	$3,960.00	$14,400.00	$29,137.03
B/C Ratio	2.25	9.00	6.75	0.66	4.80	2.00

Benefit to Cost (B/C) Ratio Analysis for Safety Improvement

General Information	
Analyst	D. Shinstine
Agency/Company	UW
Project	WRIR
Date Performed	7/11/2012

Site Information	
Facility	IRR
Road	Pingetzer Road
Analysis Time Period	2001 - 2011
Analysis Year	2012
Segment Length (mi.)	1.0

Inputs

Crash Cost

Fatal	2,500,000
Injury	60,000
Property Damage Only (PDO)	6,000

	Number of Crashes			Countermeasures				
Road Segment	*Fatal*	*Injury*	*PDO*	*A*	*B*	*C*	*D*	*E*
Pingetzer Road	0	5	2	5	6			

Calculation

	Countermeasures					
	A	*B*	*C*	*D*	*E*	Combined
Cost	$7,000.00	$750.00				$7,750.00
Benefit	$34,320.00	$124,800.00				$145,392.00
B/C Ratio	4.90	166.40				18.76

Benefit to Cost (B/C) Ratio Analysis for Safety Improvement

General Information	
Analyst	D. Shinstine
Agency/Company	UW
Project	WRIR
Date Performed	7/11/2012

Site Information	
Facility	IRR
Road	Riverview Road
Analysis Time Period	2001 - 2011
Analysis Year	2012
Segment Length (mi.)	12

Inputs

Crash Cost

Fatal	2,500,000	4008900
Injury	60,000	82600
Property Damage Only (PDO)	6,000	7400

	Number of Crashes			Countermeasures				
Road Segment	*Fatal*	*Injury*	*PDO*	*A*	*B*	*C*	*D*	*E*
Riverview Road	3	29	41	1	2	4	7	28

Calculation

	Countermeasures					
	A	*B*	*C*	*D*	*E*	Combined
Cost	$1,600.00	$6,400.00	$800.00	$10,560.00	$25,000.00	$44,360.00
Benefit	$1,422,900.00	$3,794,400.00	$2,845,800.00	$783,000.00	$2,371,500.00	$7,155,771.75
B/C Ratio	889.31	592.88	3557.25	74.15	94.86	161.31

Benefit to Cost (B/C) Ratio Analysis for Safety Improvement

General Information	
Analyst	D. Shinstine
Agency/Company	UW
Project	WRIR
Date Performed	7/11/2012

Site Information	
Facility	IRR
Road	South Fork Road
Analysis Time Period	2001 - 2011
Analysis Year	2012
Segment Length (mi.)	3.8

Inputs

Crash Cost	
Fatal	2,500,000
Injury	60,000
Property Damage Only (PDO)	6,000

	Number of Crashes			Countermeasures					
Road Segment	*Fatal*	*Injury*	*PDO*	*A*	*B*	*C*	*D*	*E*	*F*
South Fork Road	0	20	9	1	2	3	4	6	14

Calculation

	Countermeasures						
	A	*B*	*C*	*D*	*E*	*F*	Combined
Cost	$800.00	$3,200.00	$2,400.00	$3,200.00	$4,000.00	$18,000.00	$31,600.00
Benefit	$188,100.00	$501,600.00	$438,900.00	$376,200.00	$501,600.00	$275,880.00	$1,117,816.35
B/C Ratio	235.13	156.75	182.88	117.56	125.40	15.33	35.37

Benefit to Cost (B/C) Ratio Analysis for Safety Improvement

General Information	
Analyst	D. Shinstine
Agency/Company	UW
Project	WRIR
Date Performed	7/11/2012

Site Information	
Facility	IRR
Road	Trout Creek Road
Analysis Time Period	2001 - 2011
Analysis Year	2012
Segment Length (mi.)	5.0

Inputs

Crash Cost	
Fatal	2,500,000
Injury	60,000
Property Damage Only (PDO)	6,000

	Number of Crashes			Countermeasures					
Road Segment	*Fatal*	*Injury*	*PDO*	*A*	*B*	*C*	*D*	*E*	*F*
Trout Creek Road	1	5	2	2	3	4	5	7	25

Calculation

	Countermeasures						
	A	*B*	*C*	*D*	*E*	*F*	Combined
Cost	$4,000.00	$8,000.00	$1,600.00	$4,000.00	$13,200.00	$100.00	$30,900.00
Benefit	$1,124,800.00	$984,200.00	$843,600.00	$309,320.00	$135,000.00	$1,124,800.00	$2,421,741.59
B/C Ratio	281.20	123.03	527.25	77.33	10.23	11248.00	78.37

APPENDIX 6. WRIR APPLICATIONS FOR SYSTEM-WIDE IMPROVEMENTS

CHIEF WASHAKIE

SHOSHONE & ARAPAHO TRIBES
TRANSPORTATION PROGRAM
15 NORTH FORK ROAD
P.O. BOX 217
FORT WASHAKIE, WYOMING 82514
(307) 335-7669 FAX (307) 332-4557

CHIEF BLACK COAL

December 21, 2012

Kalede Ksaibati
Director
University of Wyoming, Technology Transfer Center
Dept. 3295
100 E. University Avenue
Laramie, WY 82071

Dear Sir:

Please Accept this incomplete application on behalf of the Shoshone and Arapaho Tribes, Safety Projects for the benefit of the traveling public on our Reservation Road System. As you have along with the Wyoming Department of Transportation, Mr. Matt Carlson along with both State Office and Regional offices of the Great State of Wyoming.

Have been, instrumental in the success of the upgrading the Safety of our efforts both with the development of our Pilot Safety Project that is being displayed in both National, Regional and Local levels of discussion and development as far as the overall issue of Safety is being discussed are both your personal efforts and those of data collection and reviews of problematic areas of our Road System is being engaged an brought to the table by Debbie Shinstein, of the University Staff is noteworthy.

I, have been approved by verbal approval of the Chairman of each Tribe to submit the applications at this time, They will be officially approved by the first Joint Business Council after the First of the year. Both Tribes are involved in Elections in the few weeks. Your understanding of our current status is appreciated. Please Accept Mr. Smith's Letter and signature be used as official notice of our intent to participate at the requested funding amount and contributing fund match that will required for a successful completion.

Sincerely,

John P. Smith

Application
WYDOT Highway Safety Program
High Risk Rural Road Program (HRRRP)
Application is available at http://wwweng.uwyo.edu/wyt2/

Instructions to Applicants

☑	Complete all sections of the attached application Consult the *HRRRP Program Guide* and LTAP to aid in completing the application	☑	A Funding Request for Safety Improvement table, provided by LTAP, of the proposed HRRRP project site must be attached to this application (8.5" X 11" is preferred for reproduction purposes)
☐	Application must be signed and dated on the spaces below by the individual(s) authorized to sign for the Project Sponsor	☑	Please include any pictures, maps or other visual aids of the proposed project with this application (8.5" X 11" is preferred for reproduction purposes)
☐	An Authorizing Resolution from the sponsor must be attached to this application	☐	**Application deadline:** the application must be postmarked/received by the agency shown below no later than September 30, 2009.

Mail completed application to:

University of Wyoming
Technology Transfer Center
Wyoming T²/LTAP
Dept. 3295
100 E. University Avenue
Laramie, WY 82071
Attn: Khaled Ksaibati, Director

Phone #: 800-231-2815
Fax #: (307) 766-6784
Email: khaled@uwyo.edu

http://wwweng.uwyo.edu/wyt2

Name of Applicant / Project Sponsor:

Wind River Joint Tribal Business Council

Date of Application:

Signature of Authorized Official:

Title of Authorized Official:

Project Name and Sponsor

Note: The project sponsor is a Wyoming County Government. The sponsor must initiate appropriate authorizing action – Authorizing Resolution – approved at a public meeting and signed by the sponsoring body. A sample copy of this resolution is included with this application. A copy of the Authorizing Resolution and/or reference to the meeting minutes should be included with this application. If the project application is approved by the Wyoming Transportation Commission, the Project Sponsor agrees to enter into a project agreement with WYDOT for funding and project responsibilities.

Project Sponsor: Wind River Joint Tribal Business Council

Project Name: System-Wide Sign Placement on IRR Roads

Sponsor Information

	Primary Contact	**Secondary Contact (if Applicable)**
Contact Person and Title:	John P. Smith, Transportation Director	Howard Brown, Transportation Assist.
	Shoshone Arapaho DOT	
Address:	Box 217	
	Ft. Washakie, WY 82514	
Phone:	(307) 330-7669	
Fax:		
Email:	johnsmith@wyoming.com	draw_oh_2000@yahoo.com

Project Type

Identify the type of project being proposed for funding with the High Risk Rural Road Program (HRRRP) funding: The type of project must be taken from the Wyoming Rural Road Safety Program (WRRSP) developed jointly by the County and LTAP. The needed information is summarized in the WRRSP Funding Request for Safety Improvements.

System-Wide Sign Placement
Installation of advanced warning signs, chevrons, curve warning signs, delineators, and stop signs.
For a complete list and quantities, see attached listing.

Project Description

Please give a brief, but concise description of the proposed project. Include a description of any geographical or environmental features which may be sensitive and will be impacted by this project i.e., a stream crossing or wetland intrusion to the work site. Please include a map of the general project area. It is preferred, for reproduction purposes, that this map and other supporting documents are in standard letter size (8.5" X 11") format.
If available, attach photo(s) which illustrate current road conditions.

Installation of signs throughout the Wind River Indian Reservation on roads designated as Indian Reservation Roads (IRR). Signage includes advanced warning signs, chevrons at curves, curve warning signs, stop signs, delineators at bridges and fixed objects, and dead-end barricades.

Signs will be installed on sixteen (16) IRR routes which are:
Route 19 – Cemetery Road
Route 25 – Stuart Road
Route 27 – Old Wind River Highway
Route 9003 – Dead Horse Road
Route 38 – Yellow Calf Road
Route 40 – Shipton Road
Route 33 – Thunder Lane
Route 16 – Trosper Road
Route 21 – Mill Creek Road
Route 12 – Givens Road
Route 46 – Little Wind River Bottom Road
Route 8 – Left Hand Ditch Road
Route 49 – C'Hare Lane
Route 8005 – Goes In Lodge Road
Route 4004 – St Clair Spur
Route 5 – Shoyo Road

Planning and Preliminary Considerations

Please describe the project planning and road selection criteria prior to this application being submitted. Please include the following information in the spaces provided below:

1. Has the County completed a WRRSP and coordinated with the Local Technical Assistance Program (LTAP)?	Yes
2. Does the project conform to the applicable design standards?	Yes
3. Will the County use an in-kind match in lieu of the required cost match?	Yes, own workforce and equipment

Note: If the County uses its own equipment, workforce, or materials, a Public Interest Finding must be sent to and approved by the WYDOT prior to beginning work (see Appendix C).

Real Property Acquisition

The ownership of the Right of Way or easement, for a HRRR project must vest with the County. It is advised that the Right of Way for any project be secured before the application for the project is submitted. The location of the roadway may be assumed under the County Road System, yet encumbered in some way. The title to the property must not be encumbered with conditions or reservations which prohibit the requested HRRR project. If the there is any question as to ownership or title for the property is in question, a title search would be advisable.

The county will be required to complete a WYDOT Right-of-Way Certification Form, WYDOT Form LP-2, prior to constructing the proposed HRRRP Project. A copy of WYDOT Form LP-2 is included with this application and must be submitted to WYDOT, as required by Appendix A of the *HRRRP Program Guide*. Please identify the current status of rights-of-way ownership and proposed project acquisitions.

☑ The project will be constructed within existing right-of-way and ownership is vested with the County. No additional acquisitions are needed.

☐ The project will require additional right-of-way acquisitions and they have been secured with ownership vested with the County.

☐ The project will require additional right-of-way and it will be secured, using HRRRP funds, with ownership vested with the County.

Environmental Considerations

The sponsor must comply with all Federal and State environmental regulations. Projects involving construction or combined with a larger construction/reconstruction project will require completion of an ***Environmental Document***, typically a Categorical Exclusion. The sponsor must identify the type of document required for compliance with Federal environmental regulations.
Three types of Categorical Exclusions are available for use by the project sponsor.

☑ *Categorical Exclusion Type 1*: This document is available for use on those project types presented in the *HRRRP Program Guide* Table 1. with a **design reference 1. and 2**, as these project types are all within existing rights-of-way, require minimal ground disturbance, and are not associated with any stream or drainage. For these types of projects, NEPA requirements are satisfied when the sponsor provides WYDOT with a letter presenting the project description followed by: This project is a Programmatic Categorical Exclusion under 23 CFR 771.117 (c) or (d) as approved by the Federal Highway Administration, as CE 02-27, on April 3, 2002.

☐ *Categorical Exclusion Type 2*: This document is available for use on those project types, presented in the *HRRRP Program Guide Table 1.* with a **design reference 3**, and are within existing rights-of-way, require minimal ground disturbance, and are not in proximity to a stream or drainage. For these types of projects, NEPA requirements are satisfied when the sponsor provides WYDOT with a letter presenting the project description followed by: This project is a Programmatic Categorical Exclusion under 23 CFR 771.117 (d) as approved by the Federal Highway Administration, as CE 02-27, on April 3, 2002.

☐ *Categorical Exclusion Type 3*: This document is available for use for those project types, presented in the *HRRRP Program Guide Table 1.* with a **design reference 3**, and may require minor amounts of additional rights-of-way or construction permits, or may require ground disturbance for cuts or fills, or may require work in or adjacent to streams or drainages. For these types of projects, NEPA requirements are satisfied when the sponsor analyzes project impacts to environmental resources present in the project area and provides WYDOT with a letter presenting the project description and, at a minimum, addressing the following: 1) impacts to water quality and wetlands if the project includes excavation or fill into or adjacent to streams for drainages (proposed work must qualify for a Nationwide Permit by the U.S. Army Corps of Engineers); 2) impacts to threatened or endangered species or habitat if the project includes excavation or fill into or adjacent to streams or drainages; 3) impacts to cultural resources to include a cultural survey and coordination under Section 106 of the National Historic Preservation Act.
The analysis should identify all impacts and the efforts made to avoid or minimize impacts including any proposed mitigation. This Categorical Exclusion must be signed by the Federal Highway Administration (FHWA) prior to construction.

Utility Accommodation

The sponsor must certify, prior to project construction, that utility accommodation has been completed. Please identify the current status of utility accommodation.

☑ Project will not require the relocation or adjustment of utilities.

☐ Project may require the relocation or adjustment of utilities, using HRRRP funds, and a Utility Certification will be completed, as required by Appendix A of the *HRRRP Program Guide.*

Project Maintenance

Project maintenance and perpetual care will be the responsibility of the project sponsor. Another party may do the actual physical maintenance, if an agreement is entered into between that party and the project sponsor. Should the public interest and ownership change in the future, the public maintenance responsibility can be passed along with the public title. (i.e.: County road ownership would be changed from County to City via annexation). Please state whether the project sponsor will be responsible for the maintenance directly or whether an agreement for maintenance will be entered into with another party. A copy of that agreement must be on file in the Local Government Office and should be included with this application.

Project Sponsor will be responsible for the maintenance directly.

Project Administration

Please provide the following information:

Name & Contact Information of the Project Administrator (if different than the contact person listed in section 2 above) The County's Administrator will also act as the liaison between the sponsor and WYDOT/LTAP. The project administrator will ensure compliance with various State and Federal Program requirements.	Same as contact person
Will the project design and contract bidding documents be produced by the sponsor's staff or by a consultant? If a consultant is used, WYDOT Operating Policy 40-1 must be followed.	Shoshone Arapaho DOT or their consultant will design. Project not going to bid. SADOT will order materials and perform installation with in-house forces.
Who will review the project design and contract bid documents for the sponsor, or sponsor staff?	LTAP

What governing body awards the contract?	Wind River Joint Tribal Business Council
Who will perform the construction management, including final inspection and final acceptance?	Secondary Contact (Howard Brown)

Project Budget

Cost estimates should be incorporated in this budget to reflect the costs that are expected to be incurred in the project. While project totals may exceed $100,000, Federal participation in this project is limited to $100,000.00 and must be matched at the 90.49/9.51% ratio. Any amount in excess of the required 9.51% match contributed by the sponsor is allowable and will be considered overmatch as noted below. This budget will aid in the process of selection of any project proposal for a HRRR project. The budget line items should not be understood to be absolute, as they may be changed later, if necessary, to reflect actual costs after the project has begun.

Project Element	HRRRP Funds (90.49%)	Local Match (9.51%)	Total (100%)
Engineering Costs			
Right of Way Costs			
Utility Adjustment Costs			
Construction Engineering Costs			
Construction Costs	$100,000	$9,510	$109,510
Total	$100,000	$9,510	$109,510

Note: A cash match is much easier to track, with little documentation. Also, please include a line item summary of the details of the proposed project cost estimate to include charges for engineering, design, right of way, utilities and construction items. Again, if there questions about these items, please do not hesitate to call the WYDOT office listed on the cover of this application.

Project Funding Summary

Federal HRRR funds requested (90.49% of project costs)	$100,000
Local Match (cash or other match) (9.51% of project costs)	$9,510
Other funds available as overmatch (not required)	$30,604
Total Project Cost	$140,114

Public Interest Finding

The WYDOT Highway Safety Program has determined that the HRRR Program will allow the project sponsor, as part of its proposal, to use an in-kind match in lieu of the minimum 9.51% cost match. The use of in-kind match requires WYDOT LGC advance approval, and will require that the project sponsor provide appropriate documentation to support the credited amount.

An in-kind match must have equal value to the cost match and can come from sources including:

+ a credit from donation of funds, materials, or services, and/or
+ a credit from County Force Account Work – equipment, labor, and materials, provided or performed by the project sponsor. The use of Force Account must be supported by a Public Interest Finding documented on WYDOT Form LGC-PIF and submitted with the Project Proposal.

This Appendix provides additional guidance on the documentation required to support the use of in-kind matches.

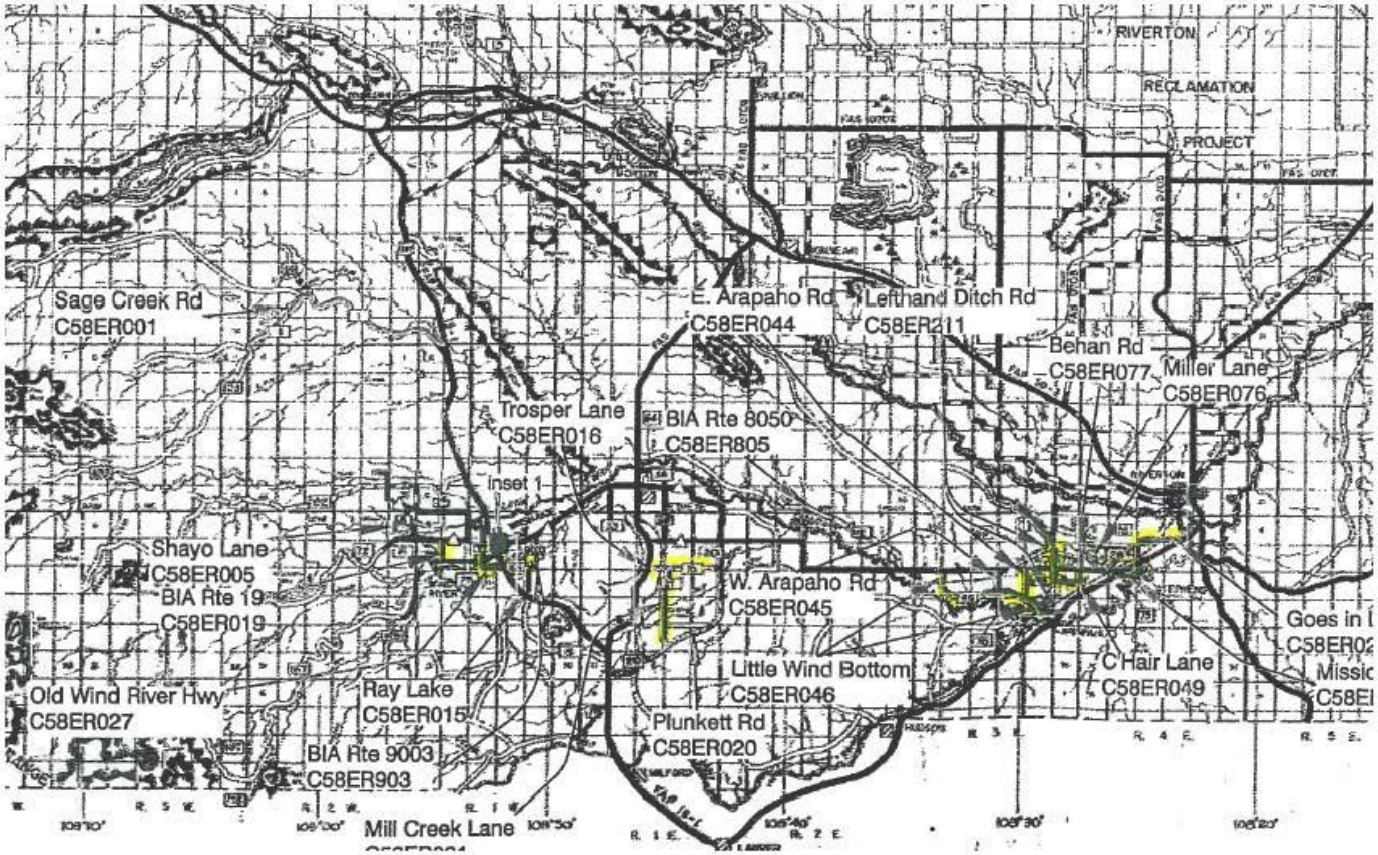
Public-owned Equipment: The project proposal must identify the type of equipment, the proposed use, the equipment hourly rental rate, and the hours of use. Mobilization, Standby, Overhead, and Profit costs will not be eligible for reimbursement, except as provided by the agreed hourly rental rate. The hourly rental rate should be determined using established Rental Rate Guides, such as Blue Book, with regional adjustments. The transporting of equipment or materials to the project site will be reimbursed using applicable equipment rental rates and operator labor rates.

Labor: Public employee equipment operator and labor rates will be supported by Sponsor records of actual standard pay, and may be adjusted to include the value of employee benefits. Overtime pay is not eligible for reimbursement.

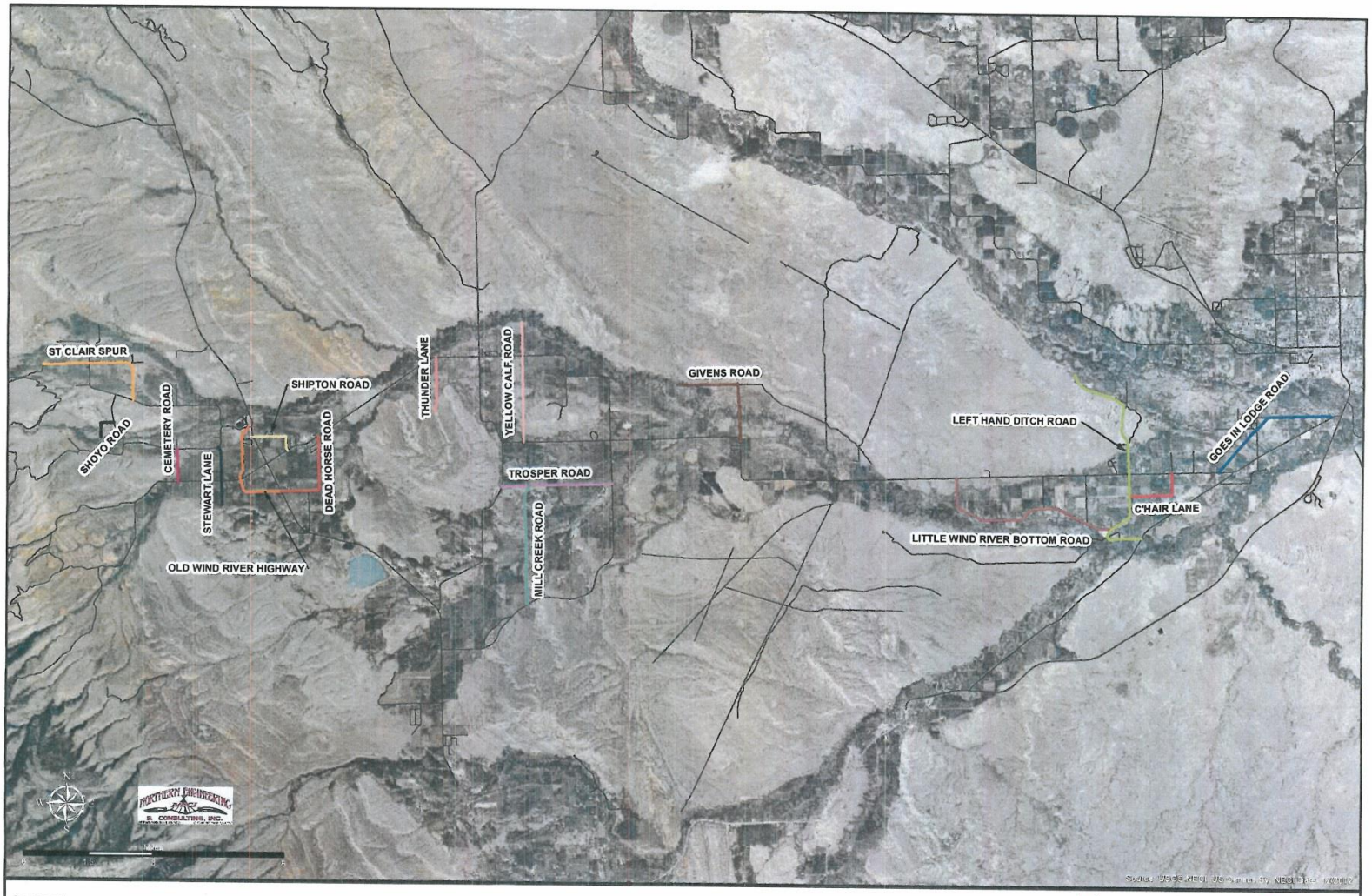
Materials: Manufactured materials, provided by the Project Sponsor, must be acquired through open, competitive bidding and will be reimbursed at invoice costs, including delivery to the project. Local materials, such as borrow, aggregates, or recycled materials, must be identified in the Proposal and identified by the type, the proposed use, the quantity, and a unit cost based on prices typical to the area.

Donated Materials and Labor: The monetary value of donated materials must be supported by evidence of current retail market value. The monetary value of donated labor/services must be consistent with public employee labor rates for similar services.

WRIR System-Wide Signs		
Description	**Designation**	**Quantity**
Stop	R1-1	3
Stop Ahead	W3-1	21
90° Curve Right	W1-1	2
90° Curve Left	W1-2	0
Curve Right	W1-2	5
Curve left	W1-3	8
Curve Right with Intersection	W1-10	1
Chevron	W1-8	138
Winding Road	W1-5	2
Intersection	W2-1	7
Intersection	W2-2	19
Intersection	W2-4	5
Road Narrows	W5-1	0
Narrow Bridge	W5-2	3
Object Marker	OM-3	40
Dead End	W14-1	5
Ahead	W16-9P	3
Advisory Speed (25 mph)	W13-1P	2
Advisory Speed (15 mph)	W13-1P	4
Double Arrow	W1-7	12
Arrow	W1-6	1
Shoulder Drop Off	W8-9A	3
Barricade (24" Wide)	Type 2	2
Barricade	Type 3	2
Steep Grade	W7-1	1
Misc		1



Wind River Indian Reservation Sign Installation Route Locations



Legend

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Sign Installation Route Locations

Methodology for Determining Safety Improvements
Wind River Indian Reservation

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However, the WRIR transportation personnel requested system wide improvements on the IRR roads that they have knowledge of crashes. These roads had similar characteristics as the county roads. By applying the same type of safety improvements on a system-wide basis, similar results would be expected.

CHIEF WASHAKIE

SHOSHONE & ARAPAHO TRIBES
TRANSPORTATION PROGRAM
15 NORTH FORK ROAD
P.O. BOX 217
FORT WASHAKIE, WYOMING 82514
(307) 335-7669 FAX (307) 332-4557

CHIEF BLACK COAL

December 21, 2012

Kalede Ksaibati
Director
University of Wyoming, Technology Transfer Center
Dept. 3295
100 E. University Avenue
Laramie, WY 82071

Dear Sir:

Please Accept this incomplete application on behalf of the Shoshone and Arapaho Tribes, Safety Projects for the benefit of the traveling public on our Reservation Road System. As you have along with the Wyoming Department of Transportation, Mr. Matt Carlson along with both State Office and Regional offices of the Great State of Wyoming.

Have been, instrumental in the success of the upgrading the Safety of our efforts both with the development of our Pilot Safety Project that is being displayed in both National, Regional and Local levels of discussion and development as far as the overall issue of Safety is being discussed are both your personal efforts and those of data collection and reviews of problematic areas of our Road System is being engaged an brought to the table by Debbie Shinstein, of the University Staff is noteworthy.

I, have been approved by verbal approval of the Chairman of each Tribe to submit the applications at this time, They will be officially approved by the first Joint Business Council after the First of the year. Both Tribes are involved in Elections in the few weeks. Your understanding of our current status is appreciated. Please Accept Mr. Smith's Letter and signature be used as official notice of our intent to participate at the requested funding amount and contributing fund match that will required for a successful completion.

Sincerely,

John P. Smith

Application
WYDOT Highway Safety Program
High Risk Rural Road Program (HRRRP)
Application is available at http://wwweng.uwyo.edu/wyt2/

Instructions to Applicants

☑	Complete all sections of the attached application Consult the *HRRRP Program Guide* and LTAP to aid in completing the application	☑	A Funding Request for Safety Improvement table, provided by LTAP, of the proposed HRRRP project site must be attached to this application (8.5" X 11" is preferred for reproduction purposes)
☐	Application must be signed and dated on the spaces below by the individual(s) authorized to sign for the Project Sponsor	☑	Please include any pictures, maps or other visual aids of the proposed project with this application (8.5" X 11" is preferred for reproduction purposes)
☐	An Authorizing Resolution from the sponsor must be attached to this application	☐	**Application deadline:** the application must be postmarked/received by the agency shown below no later than September 30, 2009. N/A

Mail completed application to:

University of Wyoming
Technology Transfer Center
Wyoming T²/LTAP
Dept. 3295
100 E. University Avenue
Laramie, WY 82071
Attn: Khaled Ksaibati, Director

Phone #: 800-231-2815
Fax #: (307) 766-6784
Email: khaled@uwyo.edu

http://wwweng.uwyo.edu/wyt2

Name of Applicant / Project Sponsor:

Wind River Joint Tribal Business Council

Date of Application:

Signature of Authorized Official:

Title of Authorized Official:

Project Name and Sponsor

Note: The project sponsor is a Wyoming County Government. The sponsor must initiate appropriate authorizing action – Authorizing Resolution – approved at a public meeting and signed by the sponsoring body. A sample copy of this resolution is included with this application. A copy of the Authorizing Resolution and/or reference to the meeting minutes should be included with this application. If the project application is approved by the Wyoming Transportation Commission, the Project Sponsor agrees to enter into a project agreement with WYDOT for funding and project responsibilities.

Project Sponsor: Wind River Joint Tribal Business Council

Project Name: System-Wide Pavement Marking on IRR Roads

Sponsor Information

	Primary Contact	**Secondary Contact (if Applicable)**
Contact Person and Title:	John P. Smith, Transportation Director	Howard Brown, Transportation Assist.
	Shoshone Arapaho DOT	
Address:	Box 217	
	Ft. Washakie, WY 82514	
Phone:	(307) 330-7669	
Fax:		
Email:	johnsmith@wyoming.com	draw_oh_2000@yahoo.com

Project Type

Identify the type of project being proposed for funding with the High Risk Rural Road Program (HRRRP) funding: The type of project must be taken from the Wyoming Rural Road Safety Program (WRRSP) developed jointly by the County and LTAP. The needed information is summarized in the WRRSP Funding Request for Safety Improvements.

System-Wide Pavement Marking
Centerline and Edgelines

187,440 linear feet (35.5 miles) of centerline, double yellow striped
46,860 Linear feet (8.9 miles) of centerline, single yellow dash
124,080 linear feet (23.5 miles) of edgeline, single white stripe

Project Description

Please give a brief, but concise description of the proposed project. Include a description of any geographical or environmental features which may be sensitive and will be impacted by this project i.e., a stream crossing or wetland intrusion to the work site. Please include a map of the general project area. It is preferred, for reproduction purposes, that this map and other supporting documents are in standard letter size (8.5" X 11") format.
If available, attach photo(s) which illustrate current road conditions.

Placement of pavement markings throughout the Wind River Indian Reservation on roads designated as Indian Reservation Roads (IRR). Pavement markings include centerline and edgelines. Total miles of pavement marking is approximately 68 miles.

Pavement Markings will be placed on sixteen (16) IRR routes which are:
Route 19 – Cemetery Road
Route 25 – Stuart Road
Route 27 – Old Wind River Highway
Route 9003 – Dead Horse Road
Route 38 – Yellow Calf Road
Route 40 – Shipton Road
Route 33 – Thunder Lane
Route 16 – Trosper Road
Route 21 – Mill Creek Road
Route 12 – Givens Road
Route 46 – Little Wind River Bottom Road
Route 8 – Left Hand Ditch Road
Route 49 – C'Hare Lane
Route 8005 – Goes In Lodge Road
Route 4004 – St Clair Spur
Route 5 – Shoyo Road

Planning and Preliminary Considerations

Please describe the project planning and road selection criteria prior to this application being submitted. Please include the following information in the spaces provided below:

1. Has the County completed a WRRSP and coordinated with the Local Technical Assistance Program (LTAP)?	Yes
2. Does the project conform to the applicable design standards?	Yes
3. Will the County use an in-kind match in lieu of the required cost match?	Yes, own workforce and equipment

Note: If the County uses its own equipment, workforce, or materials, a Public Interest Finding must be sent to and approved by the WYDOT prior to beginning work (see Appendix C).

Real Property Acquisition

The ownership of the Right of Way or easement, for a HRRR project must vest with the County. It is advised that the Right of Way for any project be secured before the application for the project is submitted. The location of the roadway may be assumed under the County Road System, yet encumbered in some way. The title to the property must not be encumbered with conditions or reservations which prohibit the

requested HRRR project. If the there is any question as to ownership or title for the property is in question, a title search would be advisable.

The county will be required to complete a WYDOT Right-of-Way Certification Form, WYDOT Form LP-2, prior to constructing the proposed HRRRP Project. A copy of WYDOT Form LP-2 is included with this application and must be submitted to WYDOT, as required by Appendix A of the *HRRRP Program Guide*. Please identify the current status of rights-of-way ownership and proposed project acquisitions.

☑ The project will be constructed within existing right-of-way and ownership is vested with the County. No additional acquisitions are needed.

☐ The project will require additional right-of-way acquisitions and they have been secured with ownership vested with the County.

☐ The project will require additional right-of-way and it will be secured, using HRRRP funds, with ownership vested with the County.

Environmental Considerations

The sponsor must comply with all Federal and State environmental regulations. Projects involving construction or combined with a larger construction/reconstruction project will require completion of an ***Environmental Document***, typically a Categorical Exclusion. The sponsor must identify the type of document required for compliance with Federal environmental regulations.
Three types of Categorical Exclusions are available for use by the project sponsor.

☑ *Categorical Exclusion Type 1*: This document is available for use on those project types presented in the *HRRRP Program Guide* Table 1. with a **design reference 1. and 2**, as these project types are all within existing rights-of-way, require minimal ground disturbance, and are not associated with any stream or drainage. For these types of projects, NEPA requirements are satisfied when the sponsor provides WYDOT with a letter presenting the project description followed by: This project is a Programmatic Categorical Exclusion under 23 CFR 771.117 (c) or (d) as approved by the Federal Highway Administration, as CE 02-27, on April 3, 2002.

☐ *Categorical Exclusion Type 2*: This document is available for use on those project types, presented in the *HRRRP Program Guide Table 1.* with a **design reference 3**, and are within existing rights-of-way, require minimal ground disturbance, and are not in proximity to a stream or drainage. For these types of projects, NEPA requirements are satisfied when the sponsor provides WYDOT with a letter presenting the project description followed by: This project is a Programmatic Categorical Exclusion under 23 CFR 771.117 (d) as approved by the Federal Highway Administration, as CE 02-27, on April 3, 2002.

☐ *Categorical Exclusion Type 3*: This document is available for use for those project types, presented in the *HRRRP Program Guide Table 1.* with a **design reference 3**, and may require minor amounts of additional rights-of-way or construction permits, or may require ground disturbance for cuts or fills, or may require work in or adjacent to streams or drainages. For these types of projects, NEPA requirements are satisfied when the sponsor analyzes project impacts to environmental resources present in the project area and provides WYDOT with a letter presenting the project description and, at a minimum, addressing the following: 1) impacts to water quality and wetlands if the project includes excavation or fill into or adjacent to streams for drainages (proposed work must qualify for a Nationwide Permit by the U.S. Army Corps of Engineers); 2) impacts to threatened or endangered species or habitat if the project includes excavation or fill into or adjacent to streams or drainages; 3) impacts to cultural resources to include a cultural survey and coordination under Section 106 of the National Historic Preservation Act.

The analysis should identify all impacts and the efforts made to avoid or minimize impacts including any proposed mitigation. This Categorical Exclusion must be signed by the Federal Highway Administration (FHWA) prior to construction.

Utility Accommodation

The sponsor must certify, prior to project construction, that utility accommodation has been completed. Please identify the current status of utility accommodation.

☑ Project will not require the relocation or adjustment of utilities.

☐ Project may require the relocation or adjustment of utilities, using HRRRP funds, and a Utility Certification will be completed, as required by Appendix A of the *HRRRP Program Guide.*

Project Maintenance

Project maintenance and perpetual care will be the responsibility of the project sponsor. Another party may do the actual physical maintenance, if an agreement is entered into between that party and the project sponsor. Should the public interest and ownership change in the future, the public maintenance responsibility can be passed along with the public title. (i.e.: County road ownership would be changed from County to City via annexation). Please state whether the project sponsor will be responsible for the maintenance directly or whether an agreement for maintenance will be entered into with another party. A copy of that agreement must be on file in the Local Government Office and should be included with this application.

Project Sponsor will be responsible for the maintenance directly.

Project Administration

Please provide the following information:

Name & Contact Information of the Project Administrator (if different than the contact person listed in section 2 above) The County's Administrator will also act as the liaison between the sponsor and WYDOT/LTAP. The project administrator will ensure compliance with various State and Federal Program requirements.	Same as contact person
Will the project design and contract bidding documents be produced by the sponsor's staff or by a consultant? If a consultant is used, WYDOT Operating Policy 40-1 must be followed.	Shoshone Arapaho DOT or their consultant will design. Project not going to bid. SADOT will order materials and perform installation with in-house forces.

Who will review the project design and contract bid documents for the sponsor, or sponsor staff?	LTAP
What governing body awards the contract?	Wind River Joint Tribal Business Council
Who will perform the construction management, including final inspection and final acceptance?	Secondary Contact (Howard Brown)

Project Budget

Cost estimates should be incorporated in this budget to reflect the costs that are expected to be incurred in the project. While project totals may exceed $100,000, Federal participation in this project is limited to $100,000.00 and must be matched at the 90.49/9.51% ratio. Any amount in excess of the required 9.51% match contributed by the sponsor is allowable and will be considered overmatch as noted below. This budget will aid in the process of selection of any project proposal for a HRRR project. The budget line items should not be understood to be absolute, as they may be changed later, if necessary, to reflect actual costs after the project has begun.

Project Element	HRRRP Funds (90.49%)	Local Match (9.51%)	Total (100%)
Engineering Costs			
Right of Way Costs			
Utility Adjustment Costs			
Construction Engineering Costs			
Construction Costs	$100,00	$9,510	$109,510
Total	$100,00	$9,510	$109,510

Note: A cash match is much easier to track, with little documentation. Also, please include a line item summary of the details of the proposed project cost estimate to include charges for engineering, design, right of way, utilities and construction items. Again, if there questions about these items, please do not hesitate to call the WYDOT office listed on the cover of this application.

Project Funding Summary

Federal HRRR funds requested (90.49% of project costs)	$100,000.00
Local Match (cash or other match) (9.51% of project costs)	$9,510.00
Other funds available as overmatch (not required)	$16,029
Total Project Cost	$125,539

Public Interest Finding

The WYDOT Highway Safety Program has determined that the HRRR Program will allow the project sponsor, as part of its proposal, to use an in-kind match in lieu of the minimum 9.51% cost match. The use of in-kind match requires WYDOT LGC advance approval, and will require that the project sponsor provide appropriate documentation to support the credited amount.

An in-kind match must have equal value to the cost match and can come from sources including:

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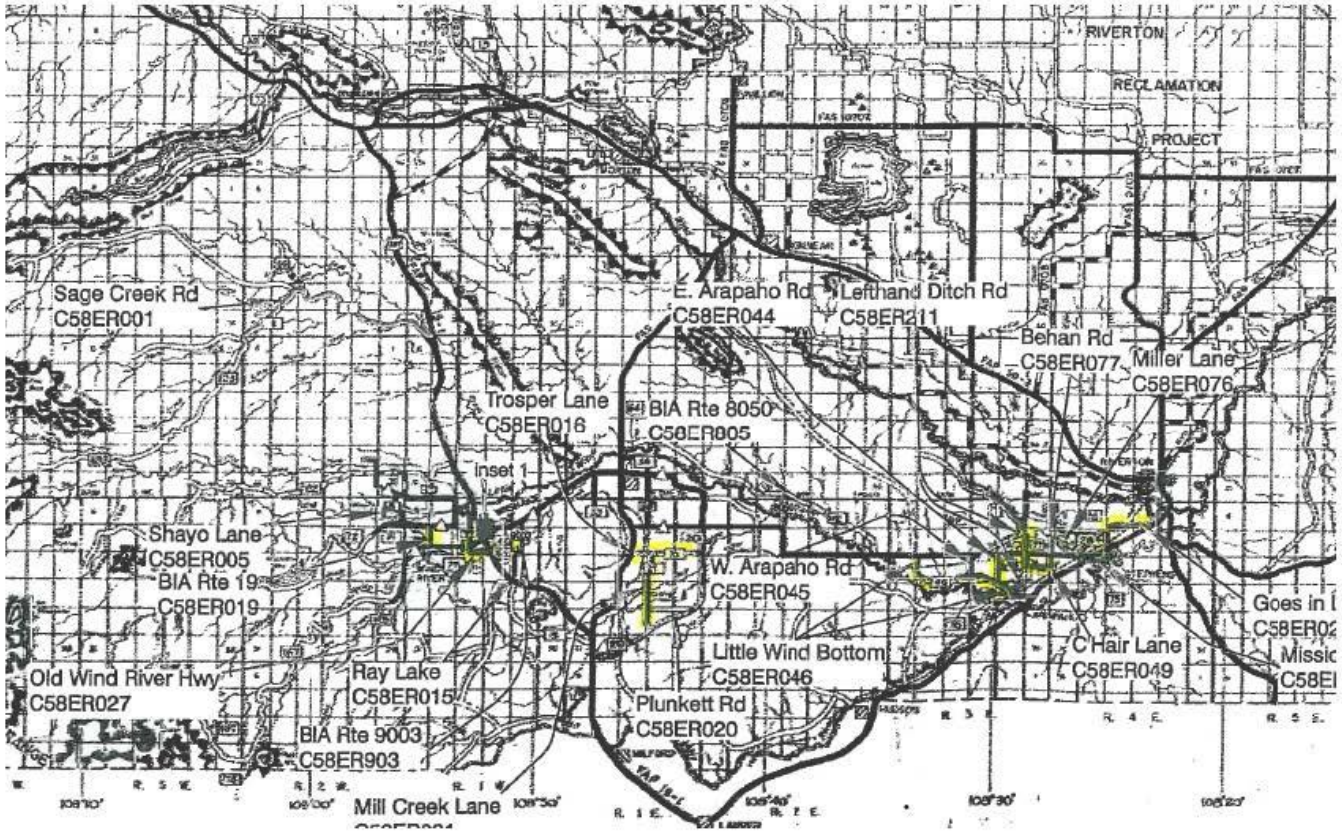
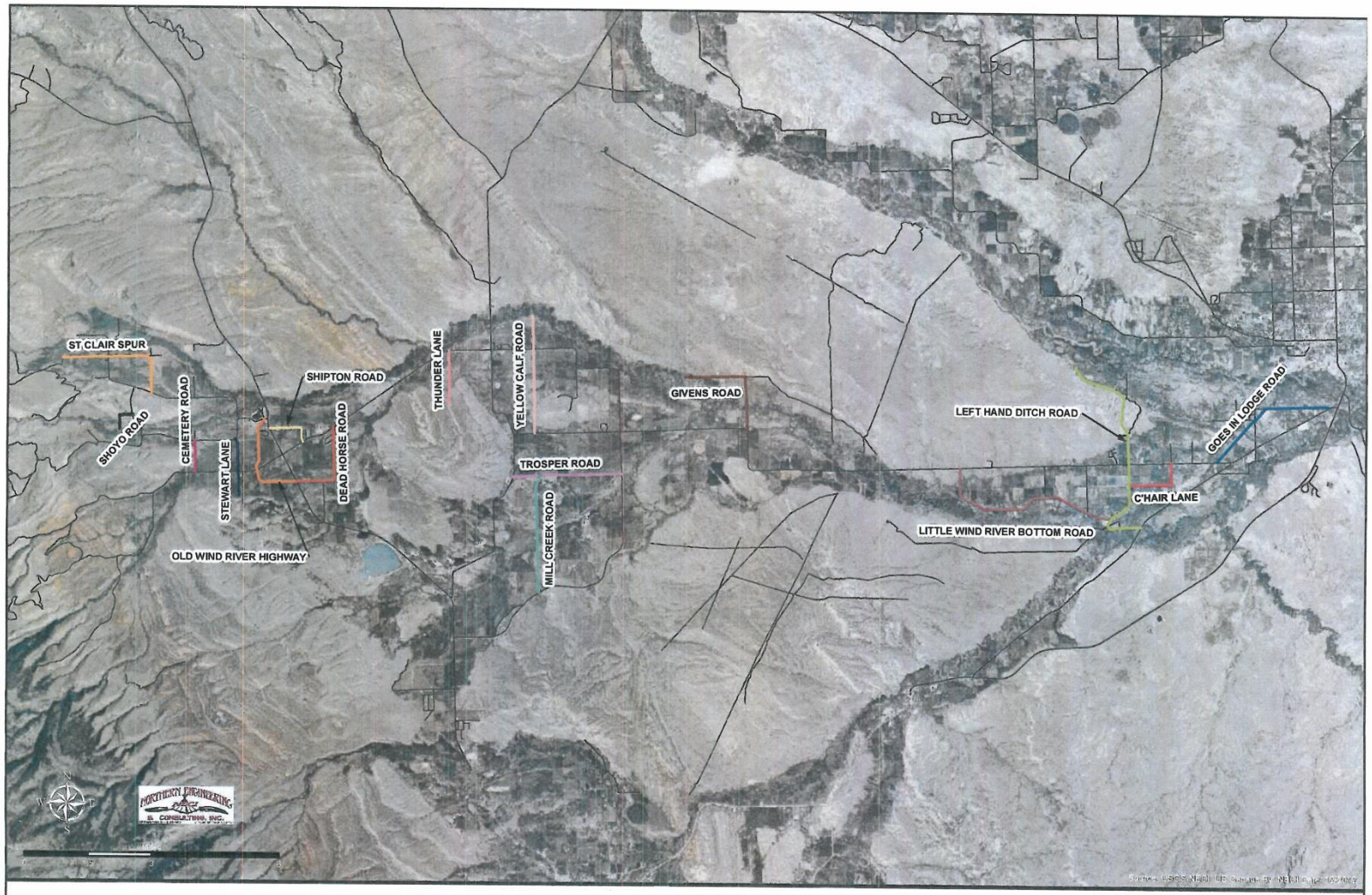


Wind River Indian Reservation Pavement Marking Locations



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Wind River Indian Reservation

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SHOSHONE & ARAPAHO TRIBES
TRANSPORTATION PROGRAM
15 NORTH FORK ROAD
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(307) 335-7669 FAX (307) 332-4557

CHIEF BLACK COAL

December 21, 2012

Kalede Ksaibati
Director
University of Wyoming, Technology Transfer Center
Dept. 3295
100 E. University Avenue
Laramie, WY 82071

Dear Sir:

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Sincerely,

John P. Smith

Application
WYDOT Highway Safety Program
High Risk Rural Road Program (HRRRP)
Application is available at http://wwweng.uwyo.edu/wyt2/

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☑	Complete all sections of the attached application Consult the *HRRRP Program Guide* and LTAP to aid in completing the application	☑	A Funding Request for Safety Improvement table, provided by LTAP, of the proposed HRRRP project site must be attached to this application (8.5" X 11" is preferred for reproduction purposes)
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Technology Transfer Center
Wyoming T^2/LTAP
Dept. 3295
100 E. University Avenue
Laramie, WY 82071
Attn: Khaled Ksaibati, Director

Phone #: 800-231-2815
Fax #: (307) 766-6784
Email: khaled@uwyo.edu

http://wwweng.uwyo.edu/wyt2

Name of Applicant / Project Sponsor:

Wind River Joint Tribal Business Council

Date of Application:

Signature of Authorized Official:

Title of Authorized Official:

Project Name and Sponsor

Note: The project sponsor is a Wyoming County Government. The sponsor must initiate appropriate authorizing action – Authorizing Resolution – approved at a public meeting and signed by the sponsoring body. A sample copy of this resolution is included with this application. A copy of the Authorizing Resolution and/or reference to the meeting minutes should be included with this application. If the project application is approved by the Wyoming Transportation Commission, the Project Sponsor agrees to enter into a project agreement with WYDOT for funding and project responsibilities.

Project Sponsor: Wind River Joint Tribal Business Council

Project Name: Guard Rail Placement on IRR Roads

Sponsor Information

	Primary Contact	**Secondary Contact (if Applicable)**
Contact Person and Title:	John P. Smith, Transportation Director	Howard Brown, Transportation Assist.
	Shoshone Arapaho DOT	
Address:	P.O. Box 217	
	Ft. Washakie, Wy 82514	
Phone:	307.335.7669	
Fax:		
Email:	johnsmith@wyoming.com	Draw_oh_2000@yahoo.com

Project Type

Identify the type of project being proposed for funding with the High Risk Rural Road Program (HRRRP) funding: The type of project must be taken from the Wyoming Rural Road Safety Program (WRRSP) developed jointly by the County and LTAP. The needed information is summarized in the WRRSP Funding Request for Safety Improvements.

Guard Rail Placement with End treatments

370 Linear feet of Guard Rail with End treatments

Project Description

Please give a brief, but concise description of the proposed project. Include a description of any geographical or environmental features which may be sensitive and will be impacted by this project i.e., a stream crossing or wetland intrusion to the work site. Please include a map of the general project area. It is preferred, for reproduction purposes, that this map and other supporting documents are in standard letter size (8.5" X 11") format.
If available, attach photo(s) which illustrate current road conditions.

Placement of guard rails at a critical location with in the Wind River Indian Reservation on a road designated as an Indian Reservation Road (IRR). The guard rail includes Corrugated Beam Guard Rail and Corrugated End Type A. Is estimated at 370 Linear Feet with Ends.

IRR Route:
Route 0046 Little Wind River Bottom Road

Planning and Preliminary Considerations

Please describe the project planning and road selection criteria prior to this application being submitted. Please include the following information in the spaces provided below:

1. Has the County completed a WRRSP and coordinated with the Local Technical Assistance Program (LTAP)?	Yes
2. Does the project conform to the applicable design standards?	Yes
3. Will the County use an in-kind match in lieu of the required cost match?	Yes, provide work force & equipment

Note: If the County uses its own equipment, workforce, or materials, a Public Interest Finding must be sent to and approved by the WYDOT prior to beginning work (see Appendix C).

Real Property Acquisition

The ownership of the Right of Way or easement, for a HRRR project must vest with the County. It is advised that the Right of Way for any project be secured before the application for the project is submitted. The location of the roadway may be assumed under the County Road System, yet encumbered in some way. The title to the property must not be encumbered with conditions or reservations which prohibit the requested HRRR project. If the there is any question as to ownership or title for the property is in question, a title search would be advisable.
The county will be required to complete a WYDOT Right-of-Way Certification Form, WYDOT Form LP-2, prior to constructing the proposed HRRRP Project. A copy of WYDOT Form LP-2 is included with this application and must be submitted to WYDOT, as required by Appendix A of the *HRRRP Program Guide*. Please identify the current status of rights-of-way ownership and proposed project acquisitions.

☑ The project will be constructed within existing right-of-way and ownership is vested with the County. No additional acquisitions are needed.

☐ The project will require additional right-of-way acquisitions and they have been secured with ownership vested with the County.

☐ The project will require additional right-of-way and it will be secured, using HRRRP funds, with ownership vested with the County.

Environmental Considerations

The sponsor must comply with all Federal and State environmental regulations. Projects involving construction or combined with a larger construction/reconstruction project will require completion of an ***Environmental Document***, typically a Categorical Exclusion. The sponsor must identify the type of document required for compliance with Federal environmental regulations.
Three types of Categorical Exclusions are available for use by the project sponsor.

☑ *Categorical Exclusion Type 1*: This document is available for use on those project types presented in the *HRRRP Program Guide* Table 1. with a **design reference 1. and 2**, as these project types are all within existing rights-of-way, require minimal ground disturbance, and are not associated with any stream or drainage. For these types of projects, NEPA requirements are satisfied when the sponsor provides WYDOT with a letter presenting the project description followed by: This project is a Programmatic Categorical Exclusion under 23 CFR 771.117 (c) or (d) as approved by the Federal Highway Administration, as CE 02-27, on April 3, 2002.

☐ *Categorical Exclusion Type 2*: This document is available for use on those project types, presented in the *HRRRP Program Guide Table 1.* with a **design reference 3**, and are within existing rights-of-way, require minimal ground disturbance, and are not in proximity to a stream or drainage. For these types of projects, NEPA requirements are satisfied when the sponsor provides WYDOT with a letter presenting the project description followed by: This project is a Programmatic Categorical Exclusion under 23 CFR 771.117 (d) as approved by the Federal Highway Administration, as CE 02-27, on April 3, 2002.

☐ *Categorical Exclusion Type 3*: This document is available for use for those project types, presented in the *HRRRP Program Guide Table 1.* with a **design reference 3**, and may require minor amounts of additional rights-of-way or construction permits, or may require ground disturbance for cuts or fills, or may require work in or adjacent to streams or drainages. For these types of projects, NEPA requirements are satisfied when the sponsor analyzes project impacts to environmental resources present in the project area and provides WYDOT with a letter presenting the project description and, at a minimum, addressing the following: 1) impacts to water quality and wetlands if the project includes excavation or fill into or adjacent to streams for drainages (proposed work must qualify for a Nationwide Permit by the U.S. Army Corps of Engineers); 2) impacts to threatened or endangered species or habitat if the project includes excavation or fill into or adjacent to streams or drainages; 3) impacts to cultural resources to include a cultural survey and coordination under Section 106 of the National Historic Preservation Act.
The analysis should identify all impacts and the efforts made to avoid or minimize impacts including any proposed mitigation. This Categorical Exclusion must be signed by the Federal Highway Administration (FHWA) prior to construction.

Utility Accommodation

The sponsor must certify, prior to project construction, that utility accommodation has been completed. Please identify the current status of utility accommodation.

☑ Project will not require the relocation or adjustment of utilities.

☐ Project may require the relocation or adjustment of utilities, using HRRRP funds, and a Utility Certification will be completed, as required by Appendix A of the *HRRRP Program Guide.*

Project Maintenance

Project maintenance and perpetual care will be the responsibility of the project sponsor. Another party may do the actual physical maintenance, if an agreement is entered into between that party and the project sponsor. Should the public interest and ownership change in the future, the public maintenance responsibility can be passed along with the public title. (i.e.: County road ownership would be changed from County to City via annexation). Please state whether the project sponsor will be responsible for the maintenance directly or whether an agreement for maintenance will be entered into with another party. A copy of that agreement must be on file in the Local Government Office and should be included with this application.

Project Sponsor will be responsible for maintain directly.

Project Administration

Please provide the following information:

Name & Contact Information of the Project Administrator (if different than the contact person listed in section 2 above) The County's Administrator will also act as the liaison between the sponsor and WYDOT/LTAP. The project administrator will ensure compliance with various State and Federal Program requirements.	Same as contact person
Will the project design and contract bidding documents be produced by the sponsor's staff or by a consultant? If a consultant is used, WYDOT Operating Policy 40-1 must be followed.	Shoshone Arapaho DOT or their consultant will design. Project not going to bid. SADOT will order materials and perform installation with in-house forces.
Who will review the project design and contract bid documents for the sponsor, or sponsor staff?	LTAP
What governing body awards the contract?	Wind River Joint Tribal Business Council
Who will perform the construction management, including final inspection and final acceptance?	Secondary contact, Howard Brown

Project Budget

Cost estimates should be incorporated in this budget to reflect the costs that are expected to be incurred in the project. While project totals may exceed $100,000, Federal participation in this project is limited to $100,000.00 and must be matched at the 90.49/9.51% ratio. Any amount in excess of the required 9.51% match contributed by the sponsor is allowable and will be considered overmatch as noted below. This budget will aid in the process of selection of any project proposal for a HRRR project. The budget line items should not be understood to be absolute, as they may be changed later, if necessary, to reflect actual costs after the project has begun.

Project Element	HRRRP Funds (90.49%)	Local Match (9.51%)	Total (100%)
Engineering Costs			
Right of Way Costs			
Utility Adjustment Costs			
Construction Engineering Costs	2,682	282	2,963
Construction Costs	10,724	1,127	11,852
Total	13,406	1,409	14,815

Note: A cash match is much easier to track, with little documentation. Also, please include a line item summary of the details of the proposed project cost estimate to include charges for engineering, design, right of way, utilities and construction items. Again, if there questions about these items, please do not hesitate to call the WYDOT office listed on the cover of this application.

Project Funding Summary

Federal HRRR funds requested (90.49% of project costs)	$13,406.00
Local Match (cash or other match) (9.51% of project costs)	$ 1,409.00
Other funds available as overmatch (not required)	
Total Project Cost	$ 14,815.00

Public Interest Finding

The WYDOT Highway Safety Program has determined that the HRRR Program will allow the project sponsor, as part of its proposal, to use an in-kind match in lieu of the minimum 9.51% cost match. The use of in-kind match requires WYDOT LGC advance approval, and will require that the project sponsor provide appropriate documentation to support the credited amount.

An in-kind match must have equal value to the cost match and can come from sources including:

+ a credit from donation of funds, materials, or services, and/or
+ a credit from County Force Account Work – equipment, labor, and materials, provided or performed by the project sponsor. The use of Force Account must be supported by a Public Interest Finding documented on WYDOT Form LGC-PIF and submitted with the Project Proposal.

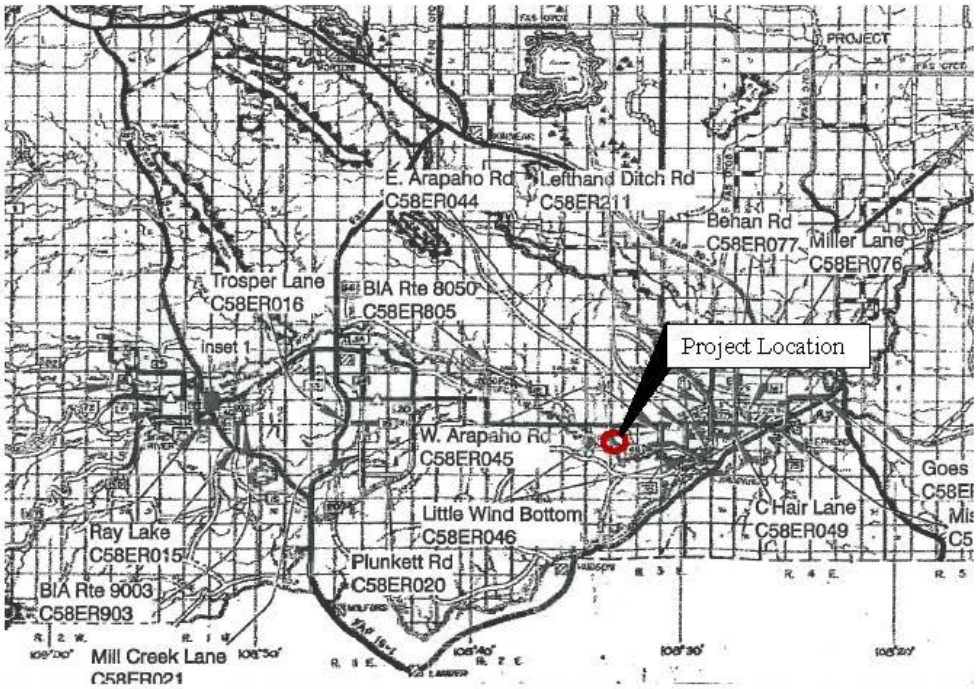
This Appendix provides additional guidance on the documentation required to support the use of in-kind matches.

Public-owned Equipment: The project proposal must identify the type of equipment, the proposed use, the equipment hourly rental rate, and the hours of use. Mobilization, Standby, Overhead, and Profit costs will not be eligible for reimbursement, except as provided by the agreed hourly rental rate. The hourly rental rate should be determined using established Rental Rate Guides, such as Blue Book, with regional adjustments. The transporting of equipment or materials to the project site will be reimbursed using applicable equipment rental rates and operator labor rates.

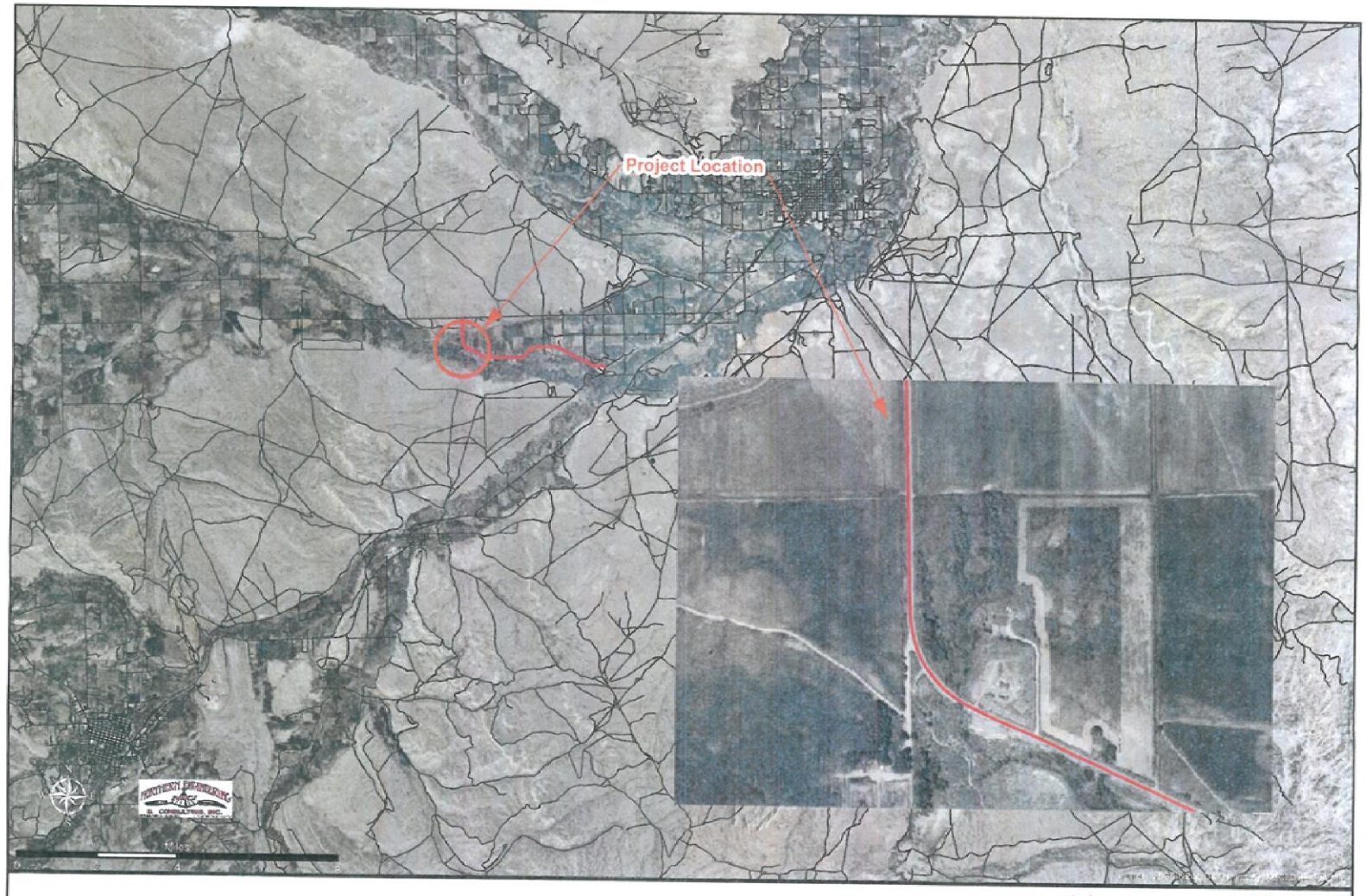
Labor: Public employee equipment operator and labor rates will be supported by Sponsor records of actual standard pay, and may be adjusted to include the value of employee benefits. Overtime pay is not eligible for reimbursement.

Materials: Manufactured materials, provided by the Project Sponsor, must be acquired through open, competitive bidding and will be reimbursed at invoice costs, including delivery to the project. Local materials, such as borrow, aggregates, or recycled materials, must be identified in the Proposal and identified by the type, the proposed use, the quantity, and a unit cost based on prices typical to the area.

Donated Materials and Labor: The monetary value of donated materials must be supported by evidence of current retail market value. The monetary value of donated labor/services must be consistent with public employee labor rates for similar services.



Wind River Indian Reservation Guard Rail Project Location



Legend

LITTLE WIND RIVER BOTTOM ROAD

PROJECT LOCATION

OTHER ROADS

Guard Rail Project Location

Methodology for Determining Safety Improvements
Wind River Indian Reservation

According to the Wyoming Rural Roads Safety Program (WRRSP), a methodology was followed to identify safety improvements for high risk locations for the Wind River Indian Reservation (WRIR). The five step methodology under the WRRSP was modified to meet the needs of the Tribes.

Crash analysis was performed for both county and Indian Reservation Roads (IRR) on the reservation. Crash locations for the IRR roads could not be determined because the inventory has no link to the WYDOT inventories. Therefore, a full review of the county roads was performed and improvements were identified.

A benefit-cost analysis was performed for the improvements on the county roads. All ratios were above 1.0 and many resulted in values over 50.0. This is an indication that the low cost improvements would in fact reduce crash risk. Since the crashes on IRR roads could not be specifically located, a benefit-cost analysis could not be performed.

However, the WRIR transportation personnel requested system wide improvements on the IRR roads that they have knowledge of crashes. These roads had similar characteristics as the county roads. By applying the same type of safety improvements on a system-wide basis, similar results would be expected.

APPENDIX 7. DRAFT WRIR TRANSPORTATION SAFETY PLAN

TRANSPORTATION SAFETY PLAN

Vision

Foster safety awareness and provide safe access throughout the Wind River Indian Reservation for all users and modes of travel.

Alternative: Transportation safety is a personal and shared responsibility. Through our partnerships, we foster safety awareness and provide safe access throughout the Wind River Indian Reservation for all users and modes of travel such that everyone arrives safely at their destination.

Mission

Improve and sustain safety for all modes of transportation through education, enforcement, engineering, and emergency medical service strategies.

Alternative: To determine how our partnerships will best improve and sustain safety for all modes of transportation and to leverage resources to save lives and prevent serious injuries from motor vehicle crashes through education, enforcement, engineering, and emergency medical service strategies.

Goals

- Raise awareness of transportation safety challenges to promote a positive change in our safety culture.
- Reduce the emotional and physical burden inflicted upon families because of a fatality or serious injury that occur on our transportation system.
- Promote non-motorized travel by improving safety, security, and infrastructure.

Commitment to Safety

The parties to this agreement will commit to continue their support of the work of the Wind River Indian Reservation's Safety Management Executive Committee, which includes representation as follows:

The *Executive Committee* is comprised of the following agencies:

- Joint Tribal Business Council
- Shoshone and Arapaho Department of Transportation
- Wyoming Department of Transportation (WYDOT)
- University of Wyoming Local Technical Assistance Program (LTAP)
- Northern Plains Tribal Technical Assistance Program
- Bureau of Indian Affairs Indian Reservation Roads (IRR) Program
- Tribal Engineering Department
- County Road Maintenance
- Tribal Courts
- Injury Prevention Resources
- Wind River Police Department (WRPD)
- County Sheriff Department
- Wyoming State Highway Patrol
- Bureau of Indian Affairs Law Enforcement
- Wind River Indian Health Services (WRIHS)
- Lander Medical Facility
- Riverton Medical Facility
- Fremont County Coroner
- Tribal Health
- Fremont County Fire Department
- Hot Springs County EMS

Ad hoc Membership includes:

- Federal Highway Administration (FHWA)
- National Highway Traffic Safety Administration (NHTSA)
- School Superintendents
- Children Advisory Groups
- Homeland Security
- First Responders
- Shoshone Planning and Grants Office

The committee is chaired/co-chaired by *** and *** representatives and plans to meet semi-annually, at a minimum, although the chair/co-chairs may call special meetings as necessary.

The purpose of this committee is to integrate and coordinate all transportation safety programs to improve and sustain transportation safety for all modes and users throughout the Wind River Indian Reservation.

The general tasks to be performed by this committee are as follows:

1. Prepare and update a Strategic Tribal Safety Management Plan.
    a. Establish and prioritize tribal safety goals and objectives.
    b. Regularly gather, analyze, and distribute information for selecting and implementing effective highway safety strategies and projects.
2. Ensure that all opportunities to improve highway safety are identified, prioritized, supported, and implemented as appropriate and evaluated in all phases of enforcement, education, engineering, and emergency response.
    a. Establish multidisciplinary subcommittees, such as a Road Safety Audit (RSA) Committee, and develop communication plans as needed, to review, recommend, implement, and report on safety emphasis areas.
3. Identify funding sources.

Current Members of the WRIR Safety Management Executive Committee

NAME, Joint Tribal Business Council	Date
NAME, Joint Tribal Business Council	Date
John Smith, Shoshone and Arapaho Department of Transportation	Date
Matthew Carlson, Wyoming Department of Transportation (WYDOT)	Date
Khaled Ksaibati, University of Wyoming Local Technical Assistance Program (LTAP)	Date
Dennis Trusty, Northern Plains Tribal Technical Assistance Program	Date
NAME, Tribal Engineering Department	Date
NAME, County Road Maintenance	Date
NAME, Injury Prevention Resources	Date
NAME, Wind River Police Department (WRPD)	Date
NAME, County Sheriff Department	Date
NAME, Wyoming State Highway Patrol	Date

NAME, Wind River Indian Health Services (WRIHS)	Date
NAME, Environmental Health Services	Date
NAME, Lander Medical Facility	Date
NAME, Riverton Medical Facility	Date
Edward McAuslan, Fremont County Coroner	Date
NAME, Fremont County Fire Department	Date
NAME, Hot Springs County EMS	Date

Emphasis Areas and Strategies

Eight emphasis areas were identified by the safety stakeholders during a safety planning meeting on April 25-26, 2012. Several strategies were also developed and are presented under each emphasis area to address specific safety concerns.

1. Safety Data
2. Emergency Services
3. Roadway Infrastructure
4. Safety Restraints
5. Impaired Driving
6. Speeding
7. Pedestrians and Bicycles
8. Young Driver Safety

Emphasis Area 1: Safety Data

Goal: Improve the completeness and accuracy of safety data to support the decision-making process.

Strategies:

- Improve completeness, accuracy, and consistency of crash data
- Improve roadway inventory data
- Continue efforts to integrate data through GIS
- Improve understanding of behavioral issues

Emphasis Area 2: Emergency Services

Goal: Improve the quality and efficiency of emergency services.

Strategies:

- Improve rural location identifier
- Improve access for emergency vehicles during poor weather
- Enhance planning for snow plow operations
- Improve emergency response times

Emphasis Area 3: Roadway Infrastructure

Goal: Improve design and maintenance practices to reduce the frequency and severity of crashes.

Strategies:

- Implement Indian Reservation Roadway Safety Program (IRRSP)
- Regain ownership of county roads
- Establish Road Safety Audit (RSA) program
- Address roadway design deficiencies
- Incorporate safety principles (e.g., forgiving roadside) in design practices
- Address maintenance issues for signing, vegetation, and debris
- Address curve safety issues (design and delineation)
- Address intersection safety issues (visibility and friction)

Emphasis Area 4: Safety Restraints

Goal: Increase the use of safety restraints.

Strategies:

- Change culture on restraint use
- Increase awareness of safety restraint laws
- Increase compliance with safety restraint laws
- Encourage motorcycle helmet use

Emphasis Area 5: Impaired Driving

Goal: Reduce the prevalence of impaired driving.

Strategies:

- Change culture on impaired driving
- Increase awareness of the dangers of impaired driving
- Increase compliance with impaired driving laws
- Consider collaborating with Injury Prevention Resources

Emphasis Area 6: Speeding

Goal: Reduce vehicle speeds, particularly in pedestrian and work zones, to minimize the severity of crashes.

Strategies:

- Reduce speeds in priority areas (school/work zones)
- Review existing posted speeds
- Education – raise awareness of fatality risk as speed increases
- Engineering – refer to Roadway Infrastructure (maintenance of signs)

Emphasis Area 7: Pedestrians and Bicycles

Goal: Reduce conflicts by providing and connecting designated facilities for pedestrians and bicyclists.

Strategies:

- Improve continuity and connectivity of pedestrian/bicycle network
- Raise awareness of pedestrian and bicycle safety issues
- Promote a safe and friendly walking and biking environment
- Identify pedestrian safety issues for school children

Emphasis Area 8: Young Driver Safety

Goal: Reduce the prevalence of crashes involving young drivers.

Strategies

- Increase awareness of young driver safety issues
- Increase compliance with distracted driving laws (cell phones, texting, etc)

Action Items and Responsible Stakeholders

This section presents the action items to be considered for each strategy within the eight emphasis areas.

Emphasis Area: Safety Data		
Strategy	Action Item	Stakeholder
Improve completeness, accuracy, and consistency of crash data	Continue efforts to input missing crashes into CARE database	
	Communicate data needs and uses to enforcement partners, including the reporting of GPS coordinates and behavioral factors	
	Install mile-markers to assist with referencing and locating	
	Improve electronic reporting capabilities	
Improve roadway inventory data	Implement Sign Inventory Program	
Continue efforts to integrate data through GIS	Coordinate link of roadway, traffic volume, and crash data	
	Tie-in with E-9-1-1 system	
Improve understanding of behavioral issues	Review citation/conviction data, conduct attitudinal surveys	

Emphasis Area: Emergency Services		
Strategy	Action Item	Stakeholder
Improve rural location identifier	Implement rural addressing system	
Provide emergency response gear	Budget for emergency response gear and update as necessary and coordinate with other partners to help with supplies	
Improve access for emergency vehicles during poor weather	Refer to Roadway Infrastructure (address roadway design deficiencies)	
Enhance planning for snow plow operations	Potential to utilize weather reporting system	
	Opportunity for weather band on WRIR	
Improve emergency response times	Review and modify emergency dispatch protocol (better understand underlying issues)	
	Consider adding medical facilities or dispatch stations to improve response times	
	Identify locations for emergency call boxes and security lighting	
	Establish an Incident Command System (ICS)	

Emphasis Area: Roadway Infrastructure		
Strategy	Action Item	Stakeholder
Implement Indian Reservation Roadway Safety Program (IRRSP)	Identify and Prioritize Safety Improvements	
Regain ownership of county roads	Coordinate with county	
Establish Road Safety Audit (RSA) program	Continue existing efforts and coordinate with IRRSP	
Address roadway design deficiencies	Upgrade roads to current standards	
Incorporate safety principles (e.g., forgiving roadside) in design practices	Identify and prioritize safety improvements in larger projects	
Address maintenance issues for signing, vegetation, and debris	Develop maintenance schedule for signing, vegetation, debris	
Address curve safety issues (design and delineation)	Identify opportunities for design and delineation improvements	
Address intersection safety issues (visibility and friction)	Identify opportunities for visibility and friction improvements	

Emphasis Area: Safety Restraints		
Strategy	Action Item	Stakeholder
Change culture on restraint use	Coordinate educational efforts with waves of enforcement	
Increase awareness of safety restraint laws	Continue educational campaigns on seatbelt use through multi-media and bilingual messages	
	Continue efforts to encourage proper installation and use of child seats	
	Coordinate with Environmental Health Services to get car seats for those in need	
	Discourage riding in the back of trucks	
	Look for opportunities to provide educational messages through School Resource Officer and at tribal events (e.g., Sundance Festival)	
Increase compliance with safety restraint laws	Continue enforcement efforts that couple rewards for good behavior with citations for non-compliance	
Encourage motorcycle helmet use	Look for opportunities to provide educational messages at tribal events (e.g., Sundance Festival)	

Emphasis Area: Impaired Driving		
Strategy	Action Item	Stakeholder
Change culture on impaired driving	Coordinate educational efforts with waves of enforcement	
Increase awareness of the dangers of impaired driving	Create and deliver educational campaigns to raise awareness of the dangers of impaired driving	
Increase compliance with impaired driving laws	Create and deliver media campaigns to alert public of enforcement efforts	
	Determine existing resources for enforcement (people, training, equipment)	
	Continue targeted enforcement efforts (checkpoints)	
	Cross-deputize BIA enforcement officers to minimize issues related to jurisdictional boundaries (look at other tribes for examples)	
Consider collaborating with Injury Prevention Resources	Coordinate with judges and prosecutors office to ensure proper discipline for severe/repeat offenders	
	Consider roving or additional BAC testing locations	

Emphasis Area: Speeding		
Strategy	Action Item	Stakeholder
Reduce speeds in priority areas (school/work zones)	Determine existing resources (people, training, equipment)	
	Increase police presence in priority areas (school/work zones)	
Review existing posted speeds	Coordinate with LTAP and BIA to develop a plan and conduct speed studies in problem areas	
	Determine if the posted speed is appropriate	
	Consider traffic calming measures in problem areas	
	Identify locations for additional speed limit signs, speed feedback signs, and automated enforcement	
Education – raise awareness of fatality risk as speed increases	Create and deliver educational campaigns to raise awareness of the dangers of speeding	
Engineering – refer to Roadway Infrastructure (maintenance of signs)	Refer to Roadway Infrastructure (maintenance of signs)	

Emphasis Area: Pedestrians and Bicycles		
Strategy	Action Item	Stakeholder
Improve continuity and connectivity of pedestrian/bicycle network	Implement Pedestrian and Walkway Long-Range Plan	
	Prioritize locations near schools and pedestrian destinations	
	Enhance pedestrian crossings at intersections and primary mid-block crossing locations	
Raise awareness of pedestrian and bicycle safety issues	Continue and enhance bike rodeos by Injury Prevention	
	Enhance pedestrian education in schools	
Promote a safe and friendly walking and biking environment	Continue and increase efforts to educate community members and implement and enforce animal laws	
Identify pedestrian safety issues for school children	Review bus stop locations, policies, and procedures to determine need for improvements	

Emphasis Area: Young Driver Safety		
Strategy	Action Item	Stakeholder
Increase awareness of young driver safety issues	Create and deliver educational campaigns to raise awareness of young driver safety issues	
	Create and deliver media campaigns to raise awareness of young driver safety issues	
Increase compliance with distracted driving laws (cell phones, texting, etc)	Create and deliver media campaigns to alert public of enforcement efforts	
	Provide targeted enforcement efforts	

Safety Management Structure

Various safety management structures were identified and considered during a safety stakeholder meeting. The strengths and limitations were discussed for each structure along with options to integrate the safety management system within the existing organizational structure.

The existing safety management efforts are operating similar to a "Function-based" structure as shown in Figure 1. The individual roles and responsibilities are clearly defined for the primary safety partners as discussed in the following section. Additionally, the SADOT has established redundancy in the roles of individuals within the agency to ensure the long-term success of the safety program in the event of staff turn-over or retirement.

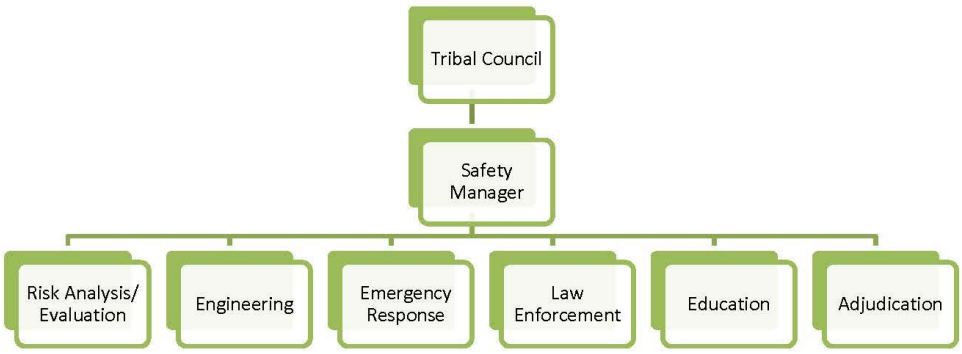


Figure 1. Sample Function-Based Safety Management Structure

Roles and Responsibilities

Safety stakeholders have been identified to support the WRIR Transportation Safety Partnership. The following list identifies the various activities to be performed under the safety management system followed by a discussion of the roles and responsibilities of stakeholders within each activity.

- Risk Analysis/Evaluation
- Traffic Engineering
- Driver Education
- Traffic Law Enforcement
- Fire/Emergency Medical Services
- Crash Data Management

Risk Analysis/Evaluation

The first step in the safety management process is to identify sites for further investigation. This will be accomplished through solicitation of input from stakeholders as well as a formal safety analysis. SADOT will obtain and provide traffic, crash, and roadway data for further analysis. The University of Wyoming (WYT^2/LTAP) will perform the data analysis and provide a summary of high risk locations. The Northern Plains TTAP, WYDOT, and BIA will provide technical assistance as necessary. Examples of technical assistance may include input on countermeasure selection and prioritization using the methods in the Highway Safety Manual. If a formal RSA program is established, this will involve a partnership between the SADOT, BIA, WRPD, and others as necessary to review specific locations, identify potential safety issues, and develop suggestions to mitigate the identified issues.

Traffic Engineering

Once the safety issues have been identified at a given location, then it is necessary to prioritize and implement the suggested strategies. SADOT will provide overall project management for the implementation of strategies and will be supported by consultants to provide engineering services. The Northern Plains TTAP, WYDOT, and BIA will provide technical assistance as necessary.

Driver Education

The University of Wyoming (WYT^2/LTAP) will conduct the crash analysis and provide recommendations for behavioral safety improvements to SADOT and BIA. SADOT and BIA will be responsible for developing the educational opportunities and reaching out to other stakeholders for support as necessary. For example, WYDOT has implemented related programs and may be able to provide examples, including:

- Roadside signing to discourage drug and substance abuse while driving.
- “Tough Guys Buckle Up” campaign to encourage seatbelt use.

Other potential partners may include Injury Prevention Resources, school superintendents, and children advisory groups. Tribal elders often command the attention and respect of the younger generation and could get involved in the process as needed, particularly for the delivery of messages. Subway has also been an effective partner in working with school age kids by providing positive reinforcement in the form of Subway gift cards.

Traffic Law Enforcement

The traffic law enforcement efforts will be led by WRPD and supported by BIA law enforcement, State Highway Patrol, and local law enforcement. WRPD is currently working with WYDOT to improve crash data through electronic reporting. They are also aggressively pursuing partnerships with other local law enforcement agencies to strengthen their enforcement efforts. The County Coroner may be a valuable partner in this effort, providing feedback on drug and alcohol use in fatal crashes. Tribal courts will be a critical partner in this area as they need to support law enforcement efforts by enforcing penalties. The state legislature could be engaged to help deal with the issue of citations for non-tribal members. The prosecutor may be able to provide a list of things to do that would help with convictions. While past efforts to solicit input from the prosecutor have been unsuccessful, it may be worth another attempt, perhaps with a letter of support from the Committee.

Fire/Emergency Medical Services

The Wind River Indiana Health Services (WRIHS) and Freemont County Fire Department provide the emergency medical services for traffic accidents on the WRIR. These emergency services recognize the need to improve response time and will be instrumental in developing this aspect of the program.

Crash Data Management

There are several stakeholders currently involved in the management of crash data for the Wind River Indian Reservation. The WRPD submits crash data directly to WYDOT and is working with WYDOT to improve the process. WYDOT ultimately manages the crash data and uploads it to the Critical Accident Reporting Environment (CARE) database. The CARE database can then be used for analysis by other stakeholders (e.g., WYT^2/LTAP) to identify safety issues and locations of concern. The WYT^2 / LTAP center will coordinate with BIA Law Enforcement and WYDOT to retrieve records that are not submitted electronically and ensure the data are collected and entered in an appropriate format for the data analysis component. The County Coroner should continue to provide feedback on roadway-related deaths to ensure that all fatal crashes are ultimately captured in the CARE database. A similar feedback loop could be established with the local hospitals to help capture injury-related crashes.

ACKNOWLEDGEMENTS

The WYT2/LTAP center provided extensive resources to develop and apply this methodology. WYDOT was extremely helpful and responsive to meet regularly, work with the WRIR to improve crash reporting and utilized precious resources to quickly enter the back log crash data. The WRIR transportation office worked diligently to coordinate meetings, respond to technical feedback and to actively participate in the application of the methodology. WRIR law enforcement was available for assistance, worked promptly with WYDOT to resolve the current data entry issue. Many others were involved in the success of this research which includes the Northern Plains TTAP, BIA and their consultants. In addition, the Tribal leadership both of the Eastern Shoshone and the Northern Arapaho along with the many stakeholders involved in the development of the Strategic Highway Safety Plan for the WRIR worked with enthusiasm taking the time from their busy schedules to make it a reality.