Kaw Nation Tribal Road Safety Plan

Kaw Nation of Oklahoma

P.O. Box 50, Kaw City, OK 74641

Kaw Nation
Tribal Road Safety Plan

Oklahoma Department of Transportation
Kaw Nation of Oklahoma
Kay County

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1.0 Introduction

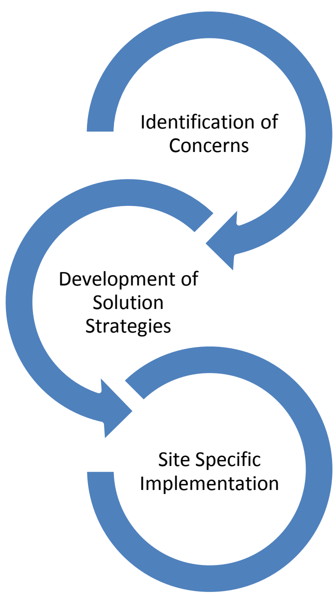
This Plan is a reflection of the Kaw Nation's commitment to road safety and maps out a unified strategy to address the important issue of highway safety on Tribal lands within Kay County, OK. The Tribal Highway Safety Plan envisions cooperation by various agencies including Oklahoma DOT and Kay County, and the Tribal Roads Department which have the authority and responsibility to build and maintain a safe road system. Some challenges associated with implementing the Plan may include being able to provide sustainable funding and developing partnerships with organizations that can assist with the education and enforcement aspects of the Plan. Recommendations provided in the Tribal Road Safety Plan focus on proven safety strategies.

This document should be considered a "living document" that will be updated over time. Persons who were not directly involved in the development of the Tribal Highway Safety Plan will need to understand how it was developed and the concerns it addresses. The following sections clearly lay out the data used to develop the plan and the process used to determine the focus areas. The Plan will also reference other documents that may prove useful in implementing the safety strategies.

This Plan was designed to complement the strategies within the *Oklahoma Transportation Improvement Program* (ODOT), which offers strategies to address many of the areas targeted in the Statewide Plan. The Plan was also designed to be compatible with the *FY2012 Performance Plan and Highway Safety Plan* initiative and the June 2014 Report on Modernizing Oklahoma's Transportation System: Progress and Challenges in Providing Safe, Efficient and Well-Maintained Roads, Highways and Bridges.

2.0 Process

The Tribal Road Safety Plan was developed through a three phase process. This process, which is illustrated in Figure 2.1, begins with the identification of concerns. The concerns for this project were identified through the evaluation of historical crash trends and meeting with community members. Strategies were identified to address those concerns, and proposed site specific implementations have been developed for areas identified in the Kaw Nation's Tribal Transportation System.



I. Identification of Concerns

Crash History Considerations

Community Concerns

II. Development of Solution Strategies

Addressing Crash Types

Addressing Road Users

III. Site Specific Implementation

Near Term Solutions

Long Term Solutions

Figure 2.1 Safety Plan Process

2.1 Phase 1: Identification of Issues

The foundation for the Safety Plan was to identify the concerns faced by the Kaw Nation community. Phase 1 included a thorough review of the community crash data and meetings with the plan stakeholders to identify areas of potential safety concern within the Kaw Nation's Tribal boundaries. Meetings were held in February 2015 to help identify concerns. Through these discussions, five focus areas were identified. The meetings included engineering and enforcement representatives from participating agencies and stakeholders that were affiliated with the Kaw Nation.

2.2 Phase 2: Development of Solution Strategies

The objective of Phase 2 was to identify, develop, and evaluate a set of solutions to address the identified concerns. These solution options include engineering and management tools that are suitable for the Kaw Nation. The solution options included short, medium, and long-term initiatives that can be implemented immediately or included in future improvement projects. Still in the planning stage, future meetings will be held with various agencies and local community groups to gain feedback on possible solution strategies, and the Kaw Nation will propose solution strategies on the basis of that feedback as well as proven engineering strategies.

2.3 Phase 3: Site Specific Implementation

Site specific implementation strategies will be included for the community's corridors identified by the planning group and with the highest crash frequency reported during the study period. These implementation strategies will be included to demonstrate ways the suggested strategies could be implemented by the community. The strategy selections for these crash-prone corridors should not be considered comprehensive or required. They are simply methods to implement safety solutions, and they may need to be adjusted to meet the community's future planning needs.

A Risk Safety Audit (RSA) shall be conducted and added to this plan where risk-laden corridors and intersections will be identified and addressed. Those sites reviewed in the RSA will be included here.

3.0 Identification of Concerns

The identification of safety concerns in the Kaw Nation community was conducted through a community involvement process, and through the review of area-wide crash history. Section 3.1 provides detailed information on the stakeholder groups involved and concerns identified through that process. Section 3.2 provides an overview of the crash history and significant trends identified in that process.

3.1 Community Input Process

Road Safety Partners

An important part of the Plan process was the identification of road safety partners within the community. These partners provided input to the identification and prioritization of road safety issues and solutions for the Tribal Highway Safety Plan, and form the foundation on which future implementation of the Plan is based. A list of stakeholders involved in the development of this Tribal Transportation Safety Plan is provided below:

- Oklahoma Department of Transportation
- Kaw Nation Tribal Police Department
- Kaw Nation Tribal Transportation Planning Department
- Kaw Nation Injury Prevention Program
- Kaw Nation Environmental Department
- Kay County Sherriff's Department
- Kay County Commissioners
- Town of Ponca City

Focus Areas

Five key road safety issues were identified during the process discussed in Section 2.1 above. These safety issues are:

- Road Geometry
- Speeding
- Pedestrians and Bicycles
- Large Trucks
- Enforcement

3.2 Crash History / SAFE-T Results

Statewide Analysis for Engineering & Technology (SAFE-T) is a systematic process that extracts useful information from the crash history on the risk and potential mitigation of crashes at both system-wide and specific locations in Oklahoma. The results of the network screening have enabled the Kaw Nation to develop community wide solution strategies. Additionally, these results are going to be used to identify locations for the planned RSA.

Using crash data provided by the Oklahoma Department of Transportation SAFE-T database, over a period of five years (2009 through 2014), a total of 355 crashes were reported within the Kaw Nation's Tribal Transportation system. As shown in Figure 3.1, twelve (12) fatalities were reported during the study period, and 48% of the crashes resulted in at least one injury. The remainder of the crashes involved property damage only.

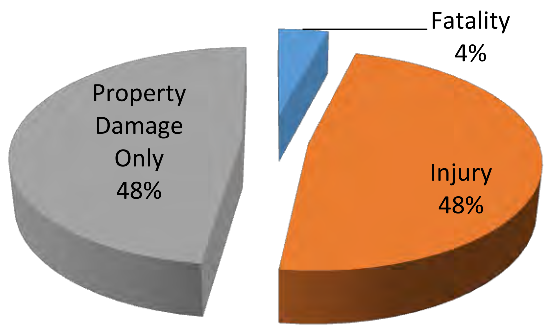
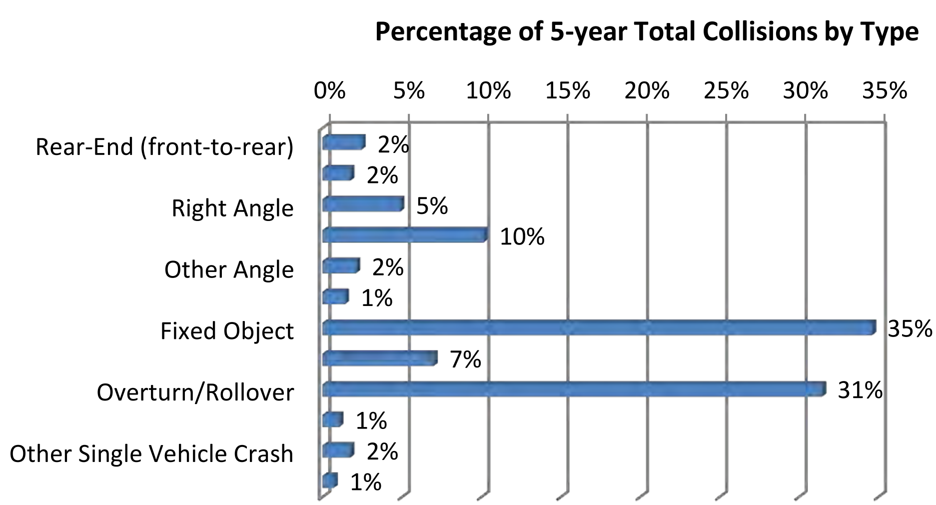


Figure 3.1 Crash Severity Distribution

Figures 3.2 and 3.3 shows the types of crashes reported in Kaw Nation Tribal Transportation system. A review of the crash types shows that Run-off Road crashes are predominant, representing 66% of all crashes. Of this type of crash, incidents involving a vehicle striking a tree, striking a fence, becoming overturned, or ending up in a ditch occurred the most (52% of the time) shown in Figure 3.3. Additional information regarding the temporal and environmental conditions for the community can be found in the appendix.

Distribution of Crash Types



• *Lane departure crashes (i.e. fixed object and overturn/rollovers) are the prevalent crash type and the most significant crash trend to address.*

Figure 3.2 Crash Type Distributions

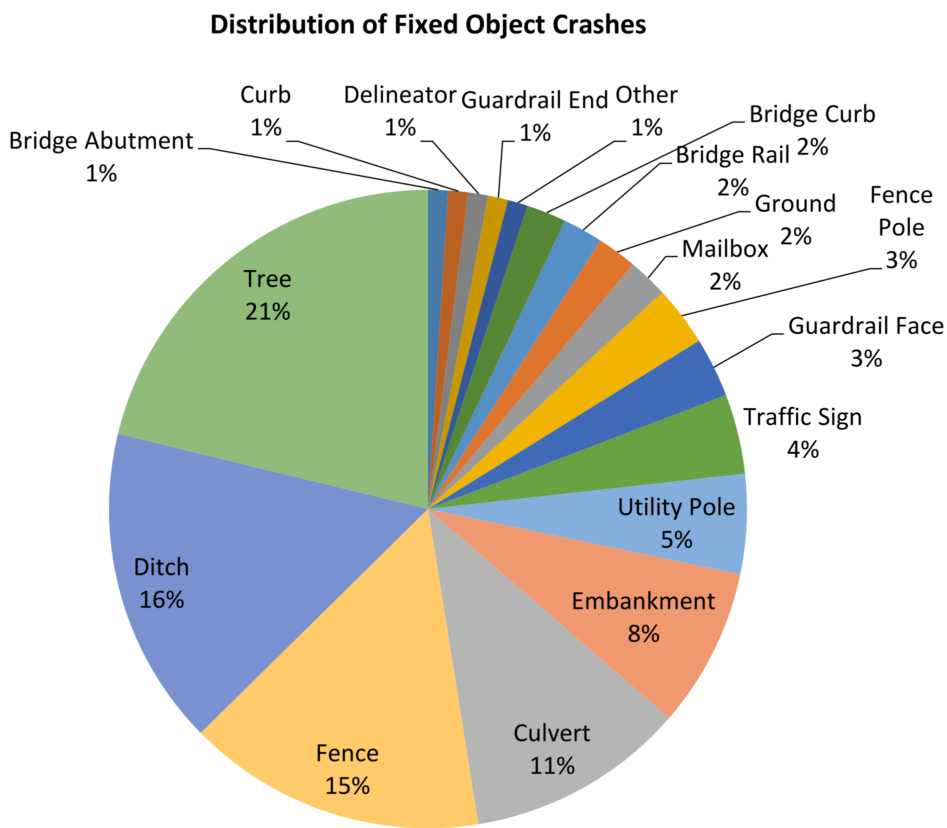


Figure 3.3 Fixed Object Crash Type Distributions

3.3 Contributing Factors

Many factors contribute to crashes, and it is important to identify the factors that can be changed. According to the FHWA, and as shown in Figure 3.3, contributing factors can be broken down into three focus areas: the driver, the roadway, and the vehicle. The following sections provide more information on the crash causes that the Kaw Nation community has the ability to influence.

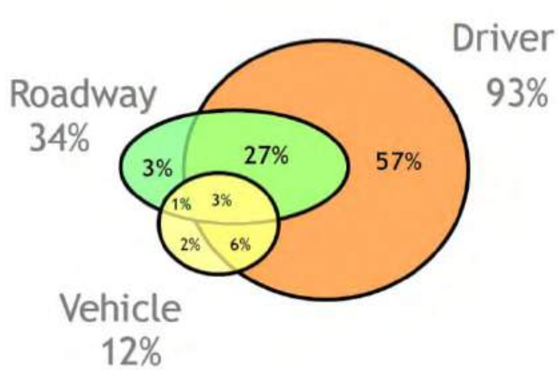


Figure 3.4 Crash Causes (Source: Road Safety 365)

The Driver

Drivers are human and as such they are prone to error. Drivers become fatigued, get distracted, and are inconsistent in their level of physical capabilities (example: visual acuity). In designing the transportation system is important to take this very important factor into account. The driver accounts for 57 percent of the cause for crashes.

The transportation system must be designed to accommodate the driver by:

- providing the necessary information to make decisions;
- providing the necessary time to receive and process that information; and,
- providing a recoverable environment for when they make an error.

In addition to designing the transportation system to accommodate human beings, a community must commit to combating the societal factors that can contribute to driver error.

The Roadway

The roadway is the second largest contributor to crashes. Roadway design must be context sensitive and accommodate all of the users of the facility. Roadways must also be designed and maintained to provide a reasonable level of safety and meet guidelines for design on the basis of functional class, see Sections 4, 5, and 6.

The modern movement towards creating safer roads by incorporating all modes of travel is referred to as *Complete Streets*. The Complete Streets concept can be explored through the following online resources:

- The National Complete Streets Coalition's website: www.completestreets.org (June 2015)
- The American Planning Association's online information:
  http://www.planning.org/research/streets/index.htm (June 2015)
- ODOT's online resources: http://www.smartgrowthamerica.org/category/oklahoma/ (June 2015)

4.0 Development of Solution Strategies

The following sections provide solution strategies to the concerns identified in the crash data review. As mentioned in the Introduction, the Tribal Transportation Safety Plan is a living document, and the deployment of solutions strategies must also be a living process. Strategies should be reviewed for their ability to be successfully implemented and maintained as well as their benefit to a location versus their cost. Most importantly, solutions should be deployed in a prioritized manner with input from community road safety partners.

The Tribal Roads Department should periodically be consulted regarding their ability to maintain tribal roads. The manpower and funding necessary to maintain roads, including signing and pavement markings is not a trivial concern. Weather conditions, especially winter snow removal, may greatly fluctuate from year to year, and planning the schedule of maintenance priorities (trunk lines, primary roads, school routes, etc.) should be coordinated and documented.

Similarly, local law enforcement (Kaw Nation, Kay County) should be integrated into the plan to help target specific enforcement needs as identified. Law enforcement often has a positive working relationship with communities which can be useful in developing education programs or publicity related to safer mobility.

4.1 Lane Departure Crash Strategies

The most common crashes experienced in the Kaw Nation community are the result of lane departure. *Lane Departure* is a term applied to all crashes that occur when a vehicle exits the lane travel is occurring in. Lane departure crashes include run off the road, sideswipe, and head-on crashes.

The following solutions will address the problem of lane departure. These solutions provide better guidance and feedback to motorists, enabling them to make better driving decisions. The solutions are presented in order of increasing planning and funding needs.

Provide and Maintain Pavement Markings

Pavement markings provide the most basic source of guidance to motorists. Pavement markings are an essential part of the traffic safety toolbox. Pavement markings are highly effective due to the way they establish the lane limits and guide motorists without requiring a high level of decision making. The placement of pavement markings provides a high level of positive guidance to motorists and can be particularly useful to drivers unfamiliar with the area.

Once pavement markings have been established, it is vital to maintain those markings to provide guidance for motorists. Pavement markings need to be evaluated on an annual basis to determine if they need to be replaced. Pavement markings on higher volume roads should be replaced on an annual to bi-annual basis. Intersections may need to have pavement marking maintenance on an annual basis due to the additional wear incurred in these areas.

Improve Signing and Delineation

Signing is a vital tool used to warn motorists of unexpected conditions and control traffic flow. While it is important to inform motorists of sudden changes in geometry, decisions points, or requirements (e.g. speed limits), it is equally important to guard against over use of signs. Too much signage can lead to driver overload and cause important messages to be lost. Signing, when most effective, draws a driver's attention to the important information they need to successfully navigate the road network.

Delineation is particularly beneficial in locations where the road geometry is complex and confusing or in locations where motorists may benefit additional guidance. Delineators are defined by the MUTCD as "retroreflective devices that are capable of clearly retroreflecting light under normal atmospheric conditions from a distance of 1,000 feet when illuminated by the high beams of standard automobile lights." The MUTCD also requires delineators to have a minimum dimension of 3 inches. Delineators are typically mounted on rigid or flexible posts and are placed according to Chapter F3 of the MUTCD2.

Provide Rumble Strips/Stripes

Rumble strips are raised or grooved patterns, typically milled in Oklahoma, on the roadway that provide both an audible warning (rumbling sound) and a physical vibration to alert drivers that they are leaving the lane. They may be installed on the roadway shoulder or on the centerline of undivided highways. If the placement of rumble strips coincides with centerline or edge line striping, the devices are referred to as rumble stripes.

Shoulder rumble strips have effectively been utilized within Oklahoma on rural freeways and expressways. Pave shoulders are required to install shoulder rumble strips. Continuous shoulder rumble strips can be applied on many miles of rural roads in a cost-effective manner, and this solution strategy should be considered on a corridor by corridor basis.

Edge line rumble stripes are similar to shoulder rumble strips as they typically are milled but are narrower. Rumble stripes are typically placed on the edge line and serve both the purpose to provide an audible signal to the driver as well as enhance the visibility of the painted edge line during dark and wet conditions. The first phase of this study found that the rumble stripes improved the longevity of the painted edge lines and that the visibility of the edge lines was improved during nighttime and wet

Similar to shoulder rumble stripes, centerline rumble stripes provide an audible warning for vehicles as they cross the centerline. The 2005 NCHRP Synthesis 339 found that head-on and sideswipe-opposite injury crashes were reduced by an estimated 21 percent at sites treated with centerline rumble strips or stripes. Centerline rumble strips/stripes have been shown to provide a crash reduction factor of 14 percent of all crashes and 15 percent of injury crashes on rural two-lane roads.

As a result of this data and their cost effectiveness, several state Departments of Transportation has recently installed centerline rumble strips on much of their rural two lane road network. It is suggested that centerline rumble strips be considered for all of the rural areas it would benefit. It is suggested, to ensure effectiveness of the countermeasure that rumble strips/stripes not be installed anywhere near a residential area due to issues with noise. Agencies that have installed them near residential areas have in many cases been forced to remove them.

Rumble strips/stripes are installed on an existing paved surface, which makes them very cost effective. These treatments are ideally suited for rural corridors with dispersed crash history and potential for collisions. Inclusion of rumble strips/stripes in more populous areas should be carefully considered due to the negative impacts associated noise pollution can have on residences and businesses.

Build Roads with Safety Edge

The Safety Edge is a specific asphalt paving technique where the interface between the roadway and graded shoulder is paved at an optimal angle to minimize vertical drop-off and provide a safer roadway edge. A Safety Edge shape can be readily attained by fitting resurfacing equipment with a device that extrudes and compacts the shape of the pavement edge as the paver passes. This mitigates shoulder pavement edge drop-offs immediately during the construction process and over the life of the pavement. This technique is not an extra procedure but merely a slight change in the paving equipment that has a minimal impact on the project cost. In addition, the Safety Edge improves the compaction of the pavement near the edge. Shoulders should still be pulled up flush with the pavement.

Include and Improve Shoulders

Shoulders provide drivers with extra time to recover if a vehicle departs the traveled way. Shoulders have been found to be a highly effective strategy in preventing fixed object crashes resulting from roadway departure. Shoulder design will vary by roadway traffic volume, classification, and road users

Paved shoulders provided many safety benefits for vehicular and non-motorized road users. Paved shoulders improve roadway drainage and can reduce the costs associated with maintaining a gravel shoulder as well as provide space for broken-down vehicles. Paved shoulders also improve conditions for non-motorized road users by increasing the comfort level of bicyclists and providing a place for pedestrians to use when sidewalks cannot be provided.

Create Safer Roadsides

Safer roadsides are created by providing adequate clear zone and recoverable, or traversable, slopes. Roadway agencies can increase the likelihood that a roadway departure results in a safe recovery rather than a crash, and mitigate the severity of crashes that do occur, by providing these features.

A clear zone is an unobstructed, traversable roadside area that allows a driver to stop safely, or regain control of a vehicle that has left the roadway. According to the *Roadside Design Guide* a clear zone is the total roadside border area, starting at the edge of the traveled way, available for safe use by errant vehicles. It is an unobstructed, relatively flat area beyond the edge of the road that allows a driver to stop safely or regain control of their vehicle. The width of the clear zone should be based on risk, also called exposure, and is based on traffic volumes, vehicle speeds, and roadside geometry.

A recoverable slope is a slope on which a motorist may, to a greater or lesser extent, retain or regain control of a vehicle by slowing or stopping. Side slopes refer to a Horizontal and Vertical ratio (H:V) on earthen slopes, a ratio flatter than 4:1 are generally considered recoverable. A non-recoverable slope is a slope which is considered traversable but on which an errant vehicle will continue to the bottom. Embankment slopes between 3:1 and 4:1 may be considered traversable but non-recoverable if they are smooth and free of fixed objects. A clear run-out area is the area at the toe of a non-recoverable slope available for safe use by an errant vehicle. Slopes steeper than 3:1 are not considered traversable and are not considered part of the clear zone.

Remove or Protect Roadside Hazards

It is always best to remove trees, rocks and other fixed objects located within the clear zone. Removing fixed objects from the clear zone will provide drivers who do leave their lane, and ultimately the roadway, adequate space to slow down and stop without striking a fixed object. Striking fixed objects leads to significantly higher injury levels; however, it may not be feasible to remove all of these objects from the clear zone.

Objects that cannot be removed from the clear zone need to be protected. While this statement may make it seem that the object is being protected, it is really the motorist and passenger who are being protected. Fixed-objects in the clear zone can be protected through devices that deflect vehicles or bring vehicles to a controlled strop through impact attenuation.

Other road hazards, such as non-traversable slopes, bridges, and bodies of water, need to be protected.

Longitudinal protection is used to deflect an errant motorist from encountering a roadside hazard. Longitudinal protection is typically provided through the use of guard rail. The example, shown on the right, is of a typical W-beam installation.

The ends of longitudinal protection, and other types of single point hazards, benefit from the use of impact attenuating devices. These devices reduce the forces experienced by vehicle occupants by reducing vehicle speed in a controlled manner.

4.2 Intersection Crash Strategies

Intersection crashes are crashes that occur at, or within the influence area, of an intersection. Intersection crashes may include lane departure crashes, such as sideswipe crashes, which were covered in the previous section. Intersection crashes also include angle, rear-end, and head-on left crash types. The two most common intersection crash types reported in the Kaw Nation community are angle and rear-end crashes.

Angle collisions are the second most common crash type in the community. They occur at intersections or driveways and typically consist of impact at a 90° angle. These crashes are commonly referred to as "T-bones".

Rear-end collisions are the third most common crash type in the community. These crashes are most commonly associated with sudden stopping, right turning vehicles, and left turning vehicles.

The following set of solutions specifically addresses the intersection crashes. These solutions highlight the roadway and environmental factors that can contribute to intersection crashes. The solutions, as with the previous section, are presented in order of increasing planning and funding needs.

Signage and Intersection Conspicuity

Signs provide regulatory, warning, and guidance messages to drivers concerning traffic control, road alignment, warning for unexpected conditions, and notice of approaching intersections. Signs need to be properly placed to allow drivers the opportunity to process and react to their messages. Signs that are improperly placed or improperly maintained can lead to driver confusion and/or poor driver decision making that can lead to crashes.

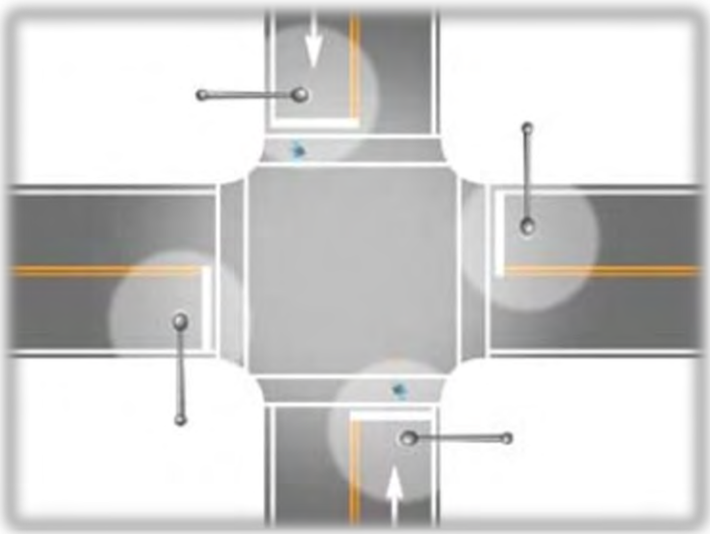
Kaw Nation members observed signs that were worn or beyond their useful life, limiting visibility and conspicuity especially during nighttime hours. Areas in which inappropriate signs were present were also identified. At these locations, driver guidance was limited by the following items:

- Broken regulatory signs may not be visible as a result of having already been hit and not replaced.
- Faded or damaged warning signs may not provide adequate delineation and guidance.

Signs must be properly placed according to the Manual of Uniform Traffic Control Devices (MTCD). Signs must also be properly maintained through vegetation control and scheduled replacement of signs to maintain retroreflectivity. Properly maintained retroreflectivity improves nighttime conspicuity and visibility.

Lighting

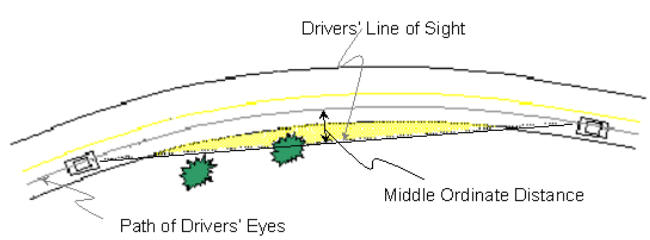
The community crash history shows that nearly half of all crashes occurred during low light conditions. According to the FHWA, crashes that occur during low light conditions trend towards more severe injuries than daylight crashes. While the reasons for this trend are varied, a cost effective solution strategy is lighting.



Installing or upgrading lighting can provide significant safety benefits for nighttime road users. Lighting increases the ability for a motorist to recognize that an intersection is ahead. Lighting also increases driver ability to successfully navigate turns and recognize other road users such as pedestrians and vehicles.

Sight Distance

The ability for motorists to see approaching intersections and other road users at intersections is vital to their ability to make appropriate decisions. Drivers should have an unobstructed view of all traffic control devices when approaching an intersection.



Drivers also need to have an unobstructed view of other road users, particularly when stopped on an approach and determining when to enter the intersecting roadway.

The AASHTO policy on Geometric Design of Highways and Streets considers intersection sight distance in terms of sight triangles. *Sight Triangles* are triangular areas defined by a distance along an intersection approach legs that should be free of obstruction from objects that could affect a motorists ability to see. Sight triangles are established on the basis of approach speed and traffic control.

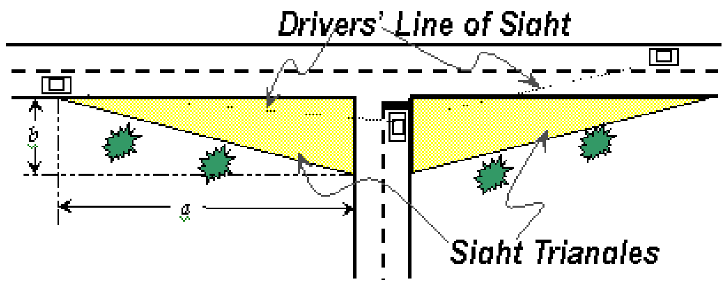


Figure 4.2 Sight Triangle Example

Providing the appropriate intersection sight distance is often a matter of keeping these areas free of vegetation, which makes this a low-cost countermeasure. Occasionally an intersection will have a deficient design for the approach speeds, leading to higher initial costs for the solution. However, the maintenance of this solution is low cost vegetation control.

Private and commercial driveways should also meet intersection sight distance guidelines. It is especially valuable to maintain appropriate sight distance on higher volume driveways. Commercial driveways may experience as much, or more, daily traffic as a side street.

Left turn Lanes

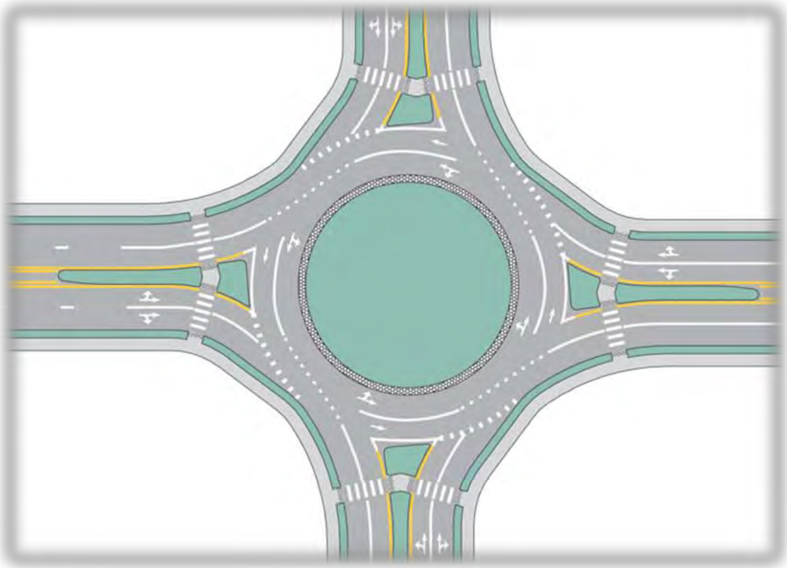
The addition of a left-turn lane can improve the operations and safety at an intersection. According to *Safety Effectiveness of Intersection Left- and Right-Turn Lanes*, a 2002 FHWA study, the addition of a left-turn lane can result in reductions of crashes from 7 to 48 percent. Left turn lanes provide benefits for through traffic by reducing delay on two-lane highways and minimizing conflicts for a through vehicle arriving behind a turning vehicle.

The decision to include a left turn lane should be based on guidelines that take conflict avoidance and safety into account. The classic guideline for this decision is the Hamerlink model (1967). NCHRP Report 457 (http://onlinepubs.trb.org/onlinepubs/nchrp/esg/esg.pdf) contains interactive features that can be used to perform this assessment.

Roundabouts

The installation of a roundabout typically increases safety at an intersection by reducing conflict points and vehicle speeds. Roundabouts typically result in a reduction in crash frequency, especially for left-turn and angle crashes, according to the Highway Safety Manual (AASHTO, 2010). The majority of crashes that resulted in angle collisions due to sight obstructions would be eliminated. In addition to reducing conflict points, the installation of a roundabout would also reduce injury severity. Thirty-eight percent of crashes resulted in either a fatality or injury during the study period. Installing a roundabout would reduce the likelihood of these serious injury crashes from occurring.

The installation of a roundabout would also reduce delay and queuing that occurs in a left-turn lane. Drivers would no longer risk choosing inadequate gaps due to frustration because of long delays. Additionally, rear-end collisions may be reduced when seasonal excessive queuing is reduced.



5.0 Site Specific Implementation

Kaw Nation Tribal Transportation System Collision Data, 2009 to 2014

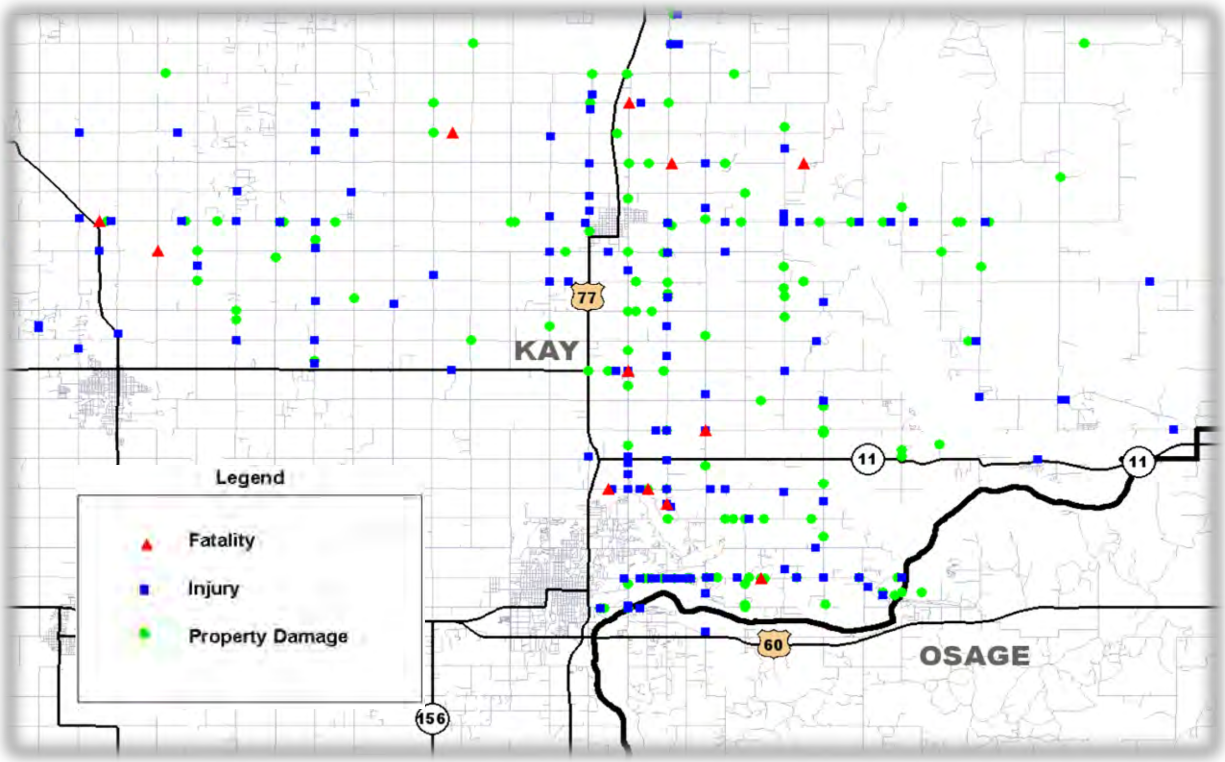


Figure 5.1 Kaw Nation Crash Map

The preceding section provided examples of solutions appropriate for the crash trends identified in the Kaw Nation community. Now that solutions have been identified, it is important to find the ways to practically apply these solutions to the tribal road system. This section identifies the two local corridors with the high frequency of crashes, and provides site specific solution strategies for the observed crash patterns.

The two corridors identified were:

- Canteen Road at Bear Creek
- John Dahl Road (North of Kildare)

Figure 5.1 provides a geographically indexed map of all crashes included in the 2009-2014 crash data. A larger version of this map, as well as a crash severity map, is provided as an appendix.

5.1 Canteen Road at Bear Creek

Canteen Road at Bear Creek is a collector for the community and carries traffic volumes ranging from 100 vehicles per day (vpd) to 300 vpd. According to the 2004-2008 crash data, the corridor experienced 5 crashes. The vast majority of crashes on this corridor resulted in property damage only collision; however, injury crashes did occur with some of them resulting in significant (A level) injuries.

This corridor will be revisited in the future after the RSA is completed. In the meantime, the following suggestions will be proffered:

Near Term Solution Suggestions:

• Providing adequate sight distance at intersections along the corridor through brush management will improve motorist decision making.

Mid to Long Term Solution Suggestions:

• The cross section of Canteen Road varies along the corridor. Areas without shoulders should be upgraded to include shoulders and more recoverable roadside. The new shoulder design should include a paved shoulder with rumble strips where possible.

• Non-crash worthy items should be removed from the clear zone where possible.

• Obstructions that cannot be removed from the clear zone should be protected.

5.2 John Dahl Road (North of Kildare)

John Dahl Road is another important local corridor in the Kaw Nation community. The route carries between 100 to 200 vpd. This corridor had 5 crashes reported in the 2009-2014 crash data. The crashes experienced on this corridor are also consistent with those experienced throughout the community.

This corridor will be revisited in the future after the RSA is completed. In the meantime, the following suggestions will be proffered:

Near Term Solution Suggestions:

• Providing adequate sight distance at intersections along the corridor through brush management will improve motorist decision making.

Mid to Long Term Solution Suggestions:

• The cross section of Canteen Road varies along the corridor. Areas without shoulders should be upgraded to include shoulders and more recoverable roadside. The new shoulder design should include a paved shoulder with rumble strips where possible.

• Non-crash worthy items should be removed from the clear zone where possible.

• Obstructions that cannot be removed from the clear zone should be protected.

6.0 Next Steps

6.1 Funding

The State and Community Highway Safety Formula Grant Program (Section 402) was developed to provide funding to implement initiatives targeted at improving safety. Section 402 funds are typically used to fund safety projects related to enforcement, education, and EMS, and can be used for a variety of safety initiatives including conducting data analyses, developing safety education programs, and conducting community-wide pedestrian safety campaigns. These funds are administered by each state's department of transportation or highway safety office; additional information is available at:

- http:// safety.fhwa.dot.gov/legislationandpolicy/policy/section402/ (June 2015).

Federal funds within the Highway Safety Improvement Program (HSIP) may be used to implement the infrastructure based improvements identified within a safety plan. HSIP funding is administered by each state's department of transportation. In most states there is an application process required to secure funding to make improvements or fund various safety initiatives. This funding is intended to assist agencies in implementing safety improvements to their transportation system. More information about HSIP can be found on the FHWA and Oklahoma DOT websites:

- http://safety.fhwa.dot.gov/hsip/ (June 2015), and
- http://www.okladot.state.ok.us/oshsp/docs.htm (June 2015).

Other local, state, federal, and private funding sources may be available for safety projects. Contacting the state's department of transportation or other county and local transportation entities may help identify other funding opportunities.

6.2 Updating the Plan

Evaluation of the safety plan should be regular and ongoing to ensure the accuracy of the data and the effectiveness of the projects and the plan. Stakeholders should meet periodically to review the plan, examine progress, and if needed, suggest changes or modifications.

As stated in the Introduction, this plan is a "living document." The ongoing evaluation of the safety plan may present clear opportunities for improvement. However, new advances in roadway development, legislation, and technology may also invite beneficial updates. Stakeholders should review these advances for possible incorporation into the plan.

Appendix A: Temporal and Environmental Conditions

Hourly Distribution of Crashes

Day | Time	1 AM - 7 AM	7 AM - 10 AM	10 AM - 4 PM	4 PM - 7 PM	7 PM - 1 AM	TOTAL	%
Sunday	10	1	9	9	7	**36**	13%
Monday	5	8	19	8	13	**53**	19%
Tuesday	7	2	14	6	6	**35**	12%
Wednesday	3	2	10	7	12	**34**	12%
Thursday	7	5	9	5	8	**34**	12%
Friday	6	7	13	8	11	**45**	16%
Saturday	10	4	5	10	20	**49**	17%
TOTAL	48	29	79	53	77	**286**	100%

• The highest hourly frequency occurred during the midday peak hours between 10 AM and 4 PM, and nighttime hours between 7 PM and 1 AM.

Percent of 5-Year Total Crashes

5-YEAR TOTALS:	2009 - 2014				
Type of Collision	**Fatality**	**Injury**	**Prpty Damage**	**Total**	**%**
Rear-End (front-to-rear)		3	4	**7**	2%
Head-On (front-to-front)		4	1	**5**	2%
Right Angle		10	4	**14**	5%
Angle Turning		11	18	**29**	10%
Other Angle		2	4	**6**	2%
Sideswipe - Same Direction				**0**	0%
Sideswipe - Opposite Direction		2	2	**4**	1%
Fixed Object	1	46	52	**99**	35%
Pedestrian		1		**1**	0%
Pedal Cycle	1			**1**	0%
Animal	1	3	16	**20**	7%
Overturn/Rollover	9	53	28	**90**	31%
Vehicle-Train			3	**3**	1%
Other Single Vehicle Crash		2	3	**5**	2%
Other			2	**2**	1%
Total	12	137	137	**286**	100.0%
Percentage	4%	48%	48%		

Weather

Weather Conditions	TOTAL	%
Clear	**147**	51%
Clouds Present	**111**	39%
Raining/Fog	**18**	6%
Snowing/Hail/Sleet	**6**	2%
Other	**4**	1%
TOTAL	**286**	100%

• 10 percent of collisions occurred under adverse road conditions.

Road Condition

Roadway Conditions	TOTAL	%
Dry	**247**	86%
Wet (water)	**18**	6%
Ice, Snow or Slush	**12**	4%
Mud, Dirt, Gravel	**7**	2%
Other	**2**	1%
TOTAL	**286**	100%

Appendix B: Crash Severity Map