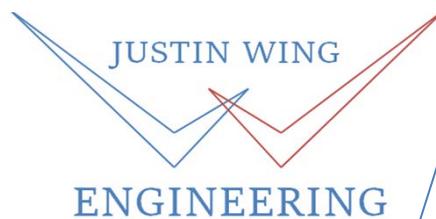

Tribal Transportation
Safety Plan

December 17, 2015



Little Traverse Bay Band of Odawa Indians

In Cooperation with the
FHWA Office of Federal Lands Highway



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Table of Contents

INTRODUCTION	1
VISION.....	1
MISSION	2
GOAL2	
SAFETY PARTNERS	2
Engineering and Planning Partners.....	2
Emergency Medical Service Partners.....	2
Education Partners.....	2
Enforcement Partners.....	3
PROCESS.....	3
EXISTING EFFORTS	6
LTBB Efforts.....	6
LTBB/Emmet County Road Commission Partnership	6
LTBB/Charlevoix County Road Commission Partnership	7
LTBB/Public Schools of Petoskey Partnership	7
LTBB/City of Petoskey Partnership	8
LTBB on the Petoskey Area Transportation Committee	8
LTBB Tribal Police Department	9
Efforts by Others.....	9
Michigan Department of Transportation.....	9
Emmet County Road Commission.....	10
Charlevoix County Road Commission	11
Bear Creek Township	11
Emmet County	12
Emmet County EMS	12
City of Petoskey	13
DATA SUMMARY	14
Crash Data.....	14
Historical Perspective.....	14
Data Sources and Assumptions.....	15
Statewide vs. Emmet County Crashes	16
Statewide vs. Emmet County Traffic Volumes.....	17

Emmet County vs. Statewide Serious Injury and Fatal Crashes.....	18
Serious Injury and Fatal Crashes by Road Jurisdiction.....	19
Emmet County vs. Statewide Alcohol Involvement.....	20
Effect of Weather on Emmet County Crashes	21
Effect of Lighting on Emmet County Crashes.....	22
Lane Departure Crashes in Emmet County.....	23
Emmet County Crashes on Curves.....	24
Intersection Crashes in Emmet County.....	25
Pedestrian and Bicycle Crashes in Emmet County.....	27
Motorcycle Crashes in Emmet County.....	28
Snowmobile Crashes in Emmet County.....	29
Other data.....	30
Pickeral Lake Road and US-31 Intersection	30
Curve on Lears Road Exit from Odawa Casino.....	31
Pedestrian and bicycle traffic in Petoskey	31
Lower Shore Drive (South) from M-119 north 1,000 feet	32
Lears Road at Howard Road Intersection	32
Cedar Valley at Greenwood Road Intersection.....	32
Resort Pike at Intertown Road Intersection	32
Pleasantview at Van Road Intersection	32
Intersections with Poor Geometry and/or Sight Distance.....	32
EMPHASIS AREAS.....	35
Emphasis Area #1: Intersections.....	35
Intersections: Objective	35
Strategies for Improving Safety at Un-signalized Intersections.....	35
Strategies for Improving Safety at Signalized Intersections	36
Intersection Safety Rankings.....	36
Intersection Ranking Summary	41
Intersection Safety Improvement Implementation.....	41
Traffic Study at Intersection of McDougal and Atkins Roads	42
Emphasis Area #2: Lane Departure and Curves.....	43
Lane Departure and Curves: Objective	43
Strategies for Addressing Lane Departure and Curves.....	44
List of Curves with Fatal or Serious Injury Crashes	45

Curve Safety Improvement Implementation	46
Emphasis Area #3: Pedestrians and Bicyclists.....	46
Pedestrians an Bicycles: Objective.....	46
Strategies for Addressing Pedestrians and Bicycle Safety	47
List of Bicycle and Pedestrian Serious Injury Crashes	47
EVALUATION & IMPLEMENTATION.....	48

List of Figures

Figure 1 - Agency List with Contacts	3
Figure 2 - Public Meeting Presentation.....	4
Figure 3 - List of Agencies Tribal Transportation Safety Plan Distribution	5
Figure 4 - Historical Perspective Data	14
Figure 5 - Data Sources	15
Figure 6 - Transportation Program Map	16
Figure 7 - Statewide Crashes vs. Emmet County Crashes	16
Figure 8 - Traffic Change By Year	18
Figure 9 - Fatalities & Serious Injuries Resulting From Traffic Crashes.....	19
Figure 10 - Ten Year Emmet County Serious Injury and Fatal Crashes by Road Jurisdiction.....	19
Figure 11 - Serious Injury and Fatal Crashes	20
Figure 12 - Breakdown Chart of Five Year Comparison	20
Figure 13 - Five Year Review Reflecting Alcohol Involvement	21
Figure 14 - Weather/Animal Related Crashes	21
Figure 15 - Weather/Animal Related Crashes Percentage	22
Figure 16 - After Dark Related Crashes.....	22
Figure 17 - Lane Departure Crashes.....	23
Figure 18 - Statewide Lane Departure Crashes.....	23
Figure 19 - Emmet County Crashes on Curves.....	24
Figure 20 - Statewide Crashes on Curves.....	24
Figure 21 - Emmet County Intersection Crashes	25

Figure 22 - Emmet County Crashes, Speed Limit 50 or Less 26

Figure 23 - Emmet County Crashes, Speed Limit 55 26

Figure 24 - Emmet County / Statewide Pedestrian and Bicycle Crashes 27

Figure 25 - Emmet County / Statewide Motorcycle Crashes 28

Figure 26 - Emmet County Crashes - Motorcycle Involved, Helmet Law 29

Figure 27 - Emmet County / Statewide Snowmobile Crashes 30

Figure 28 - Intersections: Top 20 Total Crashes 2010-2014 37

Figure 29 - Intersections: Top 20 Serious Injuries or Fatalities 2010-2014 38

Figure 30 - Accident Costs 39

Figure 31 - Intersections: Top 20 Equivalent Property Damage Only (EPDO) 2010-2014 39

Figure 32 - Intersections: Top 20 Equivalent Property Damage Only 2010-2014 40

Figure 33 - Intersections: top 20 EPDO per Million Entering Vehicles 2010-2014 41

Figure 34 - Curves: Serious Injuries or Fatalities 2010-2014 45

Figure 35 - Bicyclists and Pedestrians: Serious Injuries or Fatalities 2010-2014 47

List of Pictures

Picture 1 - State Road at Heynig Road ad Lightfoot Road 33

Picture 2 - State Road at Wormwood Road 33

Picture 3 - Stutsmanville Road at M-119 34

Picture 4 - Valley Road at Garber Road 34

INTRODUCTION

The Little Traverse Bay Band of Odawa Indians (LTBB) is committed to improving the quality of life for the members of our Tribe. We are aware that transportation accidents severely affect quality of life in a negative way. Sometimes we forget how big of an impact traffic crashes have on us.

To help understand the enormity of the impact of traffic crashes, consider that the leading cause of death for U.S. teens is motor vehicle crashes¹. In 2010, there were 32,999 people killed and 3.9 million people injured in traffic crashes in the United States² and, of those, 937 fatalities and 70,931 injuries occurred in Michigan³. During the five-year period from 2010 to 2014 within the historically delineated LTBB reservation area, 99 people were injured and 15 people were killed in transportation incidents.

According to the U.S. Department of Transportation, Office of Federal Lands Highway, injuries and fatalities on Indian lands are historically higher than for the United States as a whole. To help address safety, 2% of the Tribal Transportation Program dollars have been set aside as Tribal Transportation Safety Funds and made available to federally recognized Indian tribes as a grant program. We submitted for and were awarded one of these grants.

The Tribe is committed to improving transportation safety to reduce the risk of death and serious injury that result from incidents on our transportation systems. This plan tells the story of transportation safety needs and strategies for our community. Implementation of the plan will improve transportation safety for the Tribe, its people, and its visitors.

VISION

“Save a Life, Save a Nation”

¹ Center for Disease Control and Prevention
http://www.cdc.gov/motorvehiclesafety/teen_drivers/teendrivers_factsheet.html

² U.S. Department of Transportation, National Highway Traffic Safety Administration, “The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised)”

³ Governor’s Traffic Safety Advisory Committee, “State of Michigan Strategic Highway Safety Plan 2013-2016”

MISSION

Improve traffic safety within the Little Traverse Bay Band of Odawa Indians' reservation boundaries while observing and respecting our culture and environment.

GOAL

To prevent and reduce the number of people killed and injured in transportation-related accidents on the LTBB reservation.



SAFETY PARTNERS

Engineering and Planning Partners

- Little Traverse Bay Band of Odawa Indians (LTBB)
- Emmet County Road Commission (ECRC)
- Charlevoix County Road Commission (CCRC)
- Michigan Department of Transportation (MDOT)
- City of Petoskey
- City of Charlevoix
- City of Harbor Springs
- United States Bureau of Indian Affairs (BIA)

Emergency Medical Service Partners

- Emmet County EMS
- Allied EMS Systems

Education Partners

- North Central Michigan College
- Harbor Springs Public Schools
- Public Schools of Petoskey
- Charlevoix Public Schools

Enforcement Partners

- Michigan State Police
- Emmet County Sheriff’s Office
- Charlevoix County Sheriff’s Office
- Harbor Springs Police Department
- Petoskey Department of Public Safety
- LTBB Tribal Police Department

PROCESS

The LTBB submitted to the Federal Highway Administration, Office of Federal Lands Highway for a Tribal Transportation Safety Program Funds grant in 2013 and the grant was awarded in early 2014. In August 2014, the LTBB solicited for qualified firms and selected the C2AE team of Roger Marks, P.E. as Project Manager with Justin Wing, P.E. as the Lead Engineer in September of 2014. A project kickoff meeting was held in October 2014 at the LTBB Planning Department office with C2AE and LTBB staff attending. In May 2015 Mr. Wing separated from C2AE but stayed on the project team as Justin Wing Engineering, a sub-consultant to C2AE.

Data was collected between December 2014 and June 2015. Two main tools were used to collect crash data for the analysis, the Michigan Traffic Crash Facts (MTCF) website⁴ and Roadsoft⁵.

The following agencies were contacted directly to solicit input for the plan:

Agency	Name	Title
LTBB Planning Dept.	Amanda Swiss	Mobility Coordinator
LTBB Police Department	Jeff Cobe	Police Chief
Emmet Co Rd Commission	Brian Gutowski	Engineer-Manager
Charlevoix Co Rd Commission	Pat Harmon	Manager
Harbor Springs Police Dept.	Dan Branson	Police Chief
Petoskey Public Safety	John Calabrese	Director of Public Safety
Emmet County EMS	Larry Hansen	EMS Director
Public Schools of Petoskey	John Scholten	Superintendent
North Central Michigan College	Cameron Brunet-Koch	President

Figure 1 - Agency List with Contacts

⁴ Michigan Traffic Crash Facts: <http://www.michigantrafficcrashfacts.org/>

⁵ Roadsoft: <http://www.roadsoft.org/>

A public meeting was held at the LTBB Government Center at 7500 Odawa Circle in Harbor Springs on May 7th, 2015 where a presentation was given and further input was solicited.

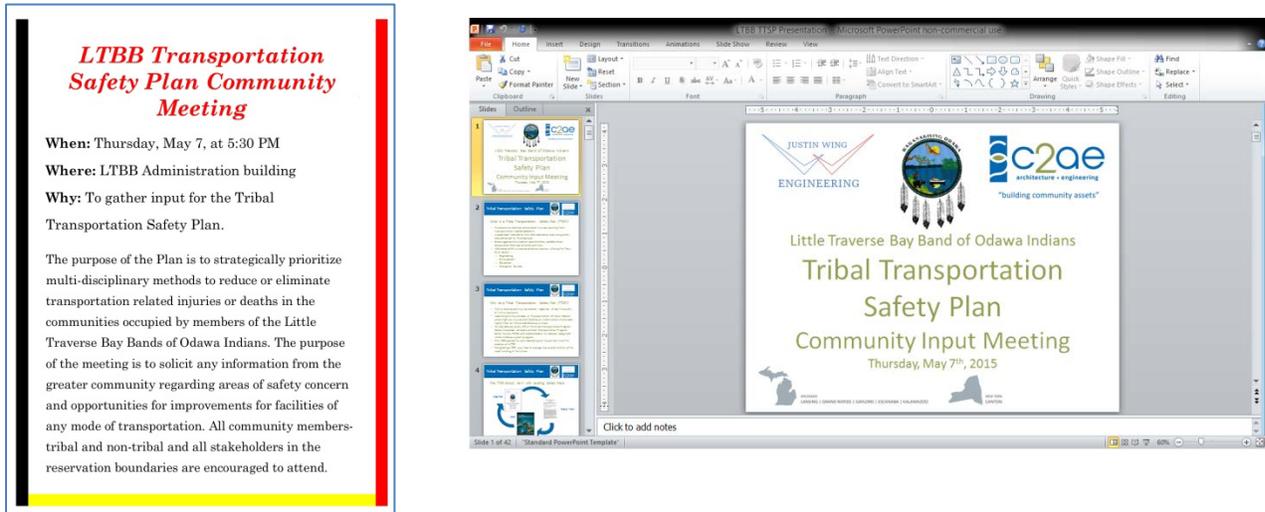


Figure 2 - Public Meeting Presentation

At the public meeting, the vision, mission, and goals of the TTSP were discussed and confirmed, as was the list of safety partners. During the data collection, trends were identified in the crash data and these trends were presented at the meeting. Based on the data trends identified, emphasis areas were discussed selected.

The Tribal Transportation Safety Plan draft was prepared in June 2015 and distributed to the following agencies for review and comment:

Name	Representing	Title
Amanda Swiss	Little Traverse Bay Band of Odawa Indians	Mobility Coordinator
Bryan Gillett	Little Traverse Bay Band of Odawa Indians	Planning Director
Jeff Cobe	LTBB Police Department	Police Chief
Brian Gutowski	Emmet County Road Commission	Engineer-Manager
Pat Harmon	Charlevoix County Road Commission	Manager
Dan Branson	Harbor Springs Police Department	Police Chief
John Calabrese	Petoskey Public Safety Department	Director of Public Safety
Larry Hansen	Emmet County EMS	EMS Director
Kent Cartwright	Petoskey Public Schools	Chief Financial Officer
Pam Gibson	Harbor Springs Public Schools	Chief Financial Officer
Jeffrey P. Bodzick	Emmet County Sheriff Department	Jail Administrator
Derek Gaylord	Charlevoix County Sheriff Department	Jail Administrator
Robert Ollar	Concorde Academy Petoskey	Executive Director
Cameron Brunet-Koch	North Central Michigan College	President
David M. Zechman, FACHE	McLaren Northern Michigan Hospital	President and CEO
Tammy Doernenburg	Emmet County Planning Department	Planning and Zoning Director
Amy Tweeten	City of Petoskey Planning Department	City Planner
Sarah Lucas, AICP	Networks Northwest	Regional Planning Director
Dennis Keiser	Bear Creek Township	Township Supervisor
Dr. W. Randolph Frykberg	Resort Township	Planner
William P. Dohm	Little Traverse Township	Township Supervisor

Figure 3 - List of Agencies Tribal Transportation Safety Plan Distribution

EXISTING EFFORTS

LTBB Efforts

Transportation safety is a priority of the Little Traverse Bay Band of Odawa Indians (LTBB), which is evidenced by the creation of this plan and by the efforts undertaken by the LTBB in the form of extensive partnerships with local and state road jurisdictions in the past which are still ongoing. In addition to the extensive partnerships with public road jurisdictions, the LTBB is responsible for the construction and maintenance of a small network of Tribal-owned roads:

- The LTBB reconstructed Hager Drive in 2008 from the US-131/Lears Road intersection easterly to Howard Road as a boulevard with center medians. The project included geometric improvements and changed the status of Hager Drive from a private to a public road. The road is maintained by the LTBB.
- The LTBB maintains the internal circulation roads at the Odawa Casino south of Petoskey.
- The LTBB maintains Odawa Circle at their Tribal Center off of Hathaway Road north of Harbor Springs.
- The LTBB maintains the internal circulation roads within their Murray Road housing complex in Charlevoix County.
- The LTBB maintains Ap-Gish-Mok Boulevard, Znow-Noong Circle, and Kee-Wad-Noong Circle at their Elder Housing property off of Heynig Road north of Harbor Springs.

LTBB/Emmet County Road Commission Partnership

The Tribe collaborates extensively with the Emmet County Road Commission (ECRC) on an annual basis to improve roads utilizing funds administered by the Federal Bureau of Indian Affairs and Federal Highway Administration as authorized by P.L. 93-638 (638 funds). The working relationship has been ongoing since 2004 and the LTBB plans to continue working with the ECRC in the future. The Tribe's annual road improvement budget is approximately \$1.2 million per year, most of which is spent to reconstruct roads under the jurisdiction of the ECRC. As part of this annual collaboration, transportation safety improvements are included in most of these road projects. Safety-related improvements include adding and/or upgrading guardrail, pavement markings, and paved shoulders as part of these road projects.

Some recent safety-related projects jointly undertaken by the ECRC and LTBB are:

- Click Road: from River Road 1.1 miles east to Cedar Valley Road
- McDougal Road: from Click Road 1.5 miles north to Greenwood Road
- Division Road: from Atkins Road 1.5 miles north to US-31
- Mitchell Road: from Meadow Lane 2 miles easterly to Fletcher Road
- Boyer Road: from Mitchell Road north 0.5 miles to Country Club Road
- Country Club Road: from Manvel Road easterly 0.5 miles to Boyer Road
- Manvel Road: from Country Club Road north 0.3 miles to US-31
- Hiawatha Road/Rosada Street: from M-119 easterly 2.3 miles to US-31
- Pleasantview Road: from M-119 northerly 3 miles to Wildberry Lane
- Hathaway Road: from Hedrick Road east 1 mile to Pleasantview Road
- State Road: from Lake Street northerly 3.2 miles to Lacount Road
- Hoyt Street: from Quick Road northerly 1.6 miles to Heynig Road
- Levering Road: from State Road easterly 4.1 miles to Larks Lake Road
- Robinson Road/Mill Street: from ½ mile west of Durkallie Road east 2.8 miles to US-31

LTBB/Charlevoix County Road Commission Partnership

Only about 15% of the original 1855 LTBB reservation lies within Charlevoix County; therefore the collaboration between the LTBB and the Charlevoix County Road Commission (CCRC) has been more limited. The tribe has, however, partnered with the CCRC on one project in the past—the reconstruction of Bear River Road from US-131 east 0.8 miles to Sterly Road. The tribe has plans to partner with the CCRC again in the near future to fund road work near the LTBB’s housing complex on Murray Road in Charlevoix County.

LTBB/Public Schools of Petoskey Partnership

The Public Schools of Petoskey are currently in the construction phase of a \$14M project to construct a new stadium and other sports facilities, and reconfigure the main access roads to and from the High School/Middle School campus and new stadium⁶. Also included in the project is a new access to the campus from the south via the extension of McDougal Road into the campus north of Atkins Road. The LTBB has partnered with Public Schools of Petoskey and committed approximately \$700,000 of our TTP dollars for the 2015 construction year to help move this project forward. The project includes tunnels under the main thoroughfares to facilitate the safe crossing of pedestrians, and a potential

⁶ <http://www.petoskeyschools.org/>

traffic signal at the Atkins and McDougal Road intersection. The project will facilitate a safer and more efficient flow of traffic to and from the school campus.

LTBB/City of Petoskey Partnership

The LTBB committed some of their 638 funds in 2012 for the Atkins Road extension in the City of Petoskey⁷. The tribe worked closely with the City and North Central Michigan College (NCMC) to help plan and partially fund this project. The project involved extending Atkins Road westerly from Kalamazoo Street to Howard Street. Prior to this project, all vehicles travelling to and from NCMC had to use Howard Street to get to the college. The access to this area was not ideal from a general mobility standpoint, and would have been especially difficult in an emergency situation or evacuation. As a result of the project, there is now an entirely new street accessing the NCMC campus and Sheridan Elementary School which is located just north of the NCMC campus.

Pedestrian travel was a primary consideration and led to the construction of sidewalks on both sides of the new street as well as pedestrian refuge islands at some key pedestrian crossings. The pedestrian islands have made for safe pedestrian crossings by providing a protected crossing as well as acting as traffic calming devices which encourage slower traffic speeds. The completion of this project has significantly reduced traffic volumes on Kalamazoo, Jennings and Howard Streets as a result of improved access to the college from the east, created more routes for emergency situations, and improved neighborhood circulation on the south side of the City.

LTBB on the Petoskey Area Transportation Committee

The LTBB was a participant in the Petoskey Area Transportation Committee from 2008 until 2013. This ad-hoc committee was originally tasked with prioritizing the expenditure of leftover funds from the Petoskey Area-wide Transportation Study which was completed in 2007. The funds for the 2007 study were reallocated from MDOT's US-31 bypass study that was conducted through the 1990's, completed in 2002, and determined to not be environmentally feasible nor publicly supported. The study funds have all been utilized as of 2013 and the committee has ceased its quarterly meetings. The committee also served as a communication forum for all of the transportation entities in the area to

⁷ <http://www.petoskey.us/departments/parks-a-recreation/10-news/featured/400-atkins-road-extension>

collaborate and coordinate transportation projects. The committee was involved in helping to spearhead and support many successful projects in the Petoskey Area, including:

- US-31 at Division Road intersection improvement: right-turn slip lane (2010)
- Petoskey-Area Access Management Plan (2011)
- US-31 at Manvel Road intersection: right-turn lane (2011)
- Atkins Road extension, Howard St to Kalamazoo St: new street with sidewalks (2012)
- US-31 (Mitchell Street) Access Management and Safety Improvement project: Installed center medians and modified intersections, moved traffic signals, installed one new traffic signal (2013)
- US-31 (Charlevoix Avenue) Reconstruction Project: Implemented a road diet and reduced driveway conflict points for safety purposes.

LTBB Tribal Police Department

The LTBB has created its own police department. Part of the LTBB Police Department's purpose is to help ensure the safety of the Tribe, as stated in their mission and purpose:

"The primary purpose and mission of our police department is to protect and serve the TRIBAL MEMBERS and TRIBAL PROPERTIES in our jurisdiction. The responsibilities associated with this purpose and missions are many. They include enforcement of LTBB Statutes, support of LTBB Constitution and the Constitution of the United States, maintaining the peace and order of the Tribe, protecting the property and personal safety of the Tribe, and generally assisting Tribal Members in urgent situations."

Efforts by Others

Michigan Department of Transportation

MDOT has a Strategic Highway Safety Plan⁸ that was most recently updated in 2013 that outlines their strategy to improve transportation safety statewide.

MDOT has a Highway Safety Improvement Program that prioritizes and funds projects based on their potential safety benefit. The program includes both a Trunkline Safety Program and a Local Agency

⁸ https://www.michigan.gov/documents/msp/SHSP_2013_08_web_412992_7.pdf

Safety Program. As part of the trunkline safety program, MDOT has made the following safety improvements in the area in recent years:

- Constructed a center left-turn lane on US-31 near Pickeral Lake Rd (2006)
- Constructed a center left-turn lane on US-31 from Shaw to Graham Rds. (2008)
- Constructed an offset right-turn lane from US-31 onto Boyne City Road to improve visibility and reduce right-angle crashes (2010)
- US-31 (Mitchell Street) Access Management and Safety Improvement project: Installed center medians and modified intersections, moved traffic signals, installed one new traffic signal (2013)
- Constructed a center left-turn lane, reduced driveway access points, and implemented a road diet on US-31 (Charlevoix Ave) from Camp Daggett Rd to US-131 (2015)

Emmet County Road Commission

ECRC is committed to improving transportation safety on its roadway system. ECRC has taken advantage of the Michigan Department of Transportation Local Agency Safety Program mentioned above, which is available to fund ECRC projects that have a history of traffic crashes that are likely to be reduced as a result of a construction project. From the MDOT website⁹: *“Federal funds for the Local Safety Program are to be used for highway safety improvements on the local roadway system. All locally controlled roadways, regardless of National Functional Classification, are eligible for the Local Safety Program.”*

The ECRC has participated in this program in the past and has received funding for the following projects:

- Mitchell Road @ Division Road: Upgrade existing signal to box span with left turn phasing and permanent signing (2015)
- Guardrail upgrades on Robinson Road and Townline Road
- Other miscellaneous guardrail upgrades

In addition to MDOT-funded safety projects, the ECRC routinely exceeds safety standards on their federal-aid road projects. The minimum pavement width on a federal-aid road is 26 feet, but ECRC’s standard is for a 30-foot width to provide more shoulder space for vehicle recovery, pedestrians, and

⁹ http://www.michigan.gov/mdot/0,4616,7-151-9625_25885_40552---,00.html

bicyclists. The ECRC also has an annual pavement marking program with a budget of \$25K and upgrades guardrail as a part of township-funded road projects.

With the opening of the LTBB's Odawa Casino in 2007, the ECRC worked closely with the LTBB on transportation safety and mobility upgrades in the vicinity of the new casino.

- Lears Road was extended west to Cemetery road from its former terminus at Anderson Road and now serves as the main entrance to the Odawa Casino (2007).
- The ECRC worked with MDOT to install a traffic signal at the intersection of Lears Road and US-131 (2007).
- Lears Road widened from three lanes to five lanes from Cemetery Road to US-131 and traffic signals installed at the Lears Road intersections with Anderson and Cemetery Roads (2009).
- The LTBB installed a separate pedestrian path partly in county road right-of-way along Anderson Road from the Petoskey city limits south to Lears Road and then west to Cemetery Road (2009).

Charlevoix County Road Commission

The Charlevoix County Road Commission (CCRC) has shown its commitment to transportation safety by completing several road projects within the LTBB reservation boundary in recent years. Recent projects involving the CCRC are:

- Construction of an upgraded three-lane approach to US-31 at the intersection of Boyne City Road, allowing motorists to have dedicated left- and right-turn lanes from Boyne City Road onto US-31 (2005).
- Reconstruction of Boyne City road with addition of paved shoulders from Western Avenue (near US-31) easterly 10 miles to Sumner Road (2012).

Bear Creek Township

Bear Creek Township has been active in the area of transportation safety by participating in discussions for the Petoskey Bypass, the Petoskey Area-Wide Transportation Study, and as a regular member of the Petoskey Area Transportation Committee from 2008 to 2013. Bear Creek Township also works with the ECRC to fund road improvements in their township.

Emmet County

As one of the anchor members of the Petoskey Area Transportation Committee from 2008 to 2013 and the Access Management Subcommittee from 2008 to 2011, Emmet County has been committed to transportation safety. Emmet County has also been responsible for spearheading much of the construction and funding the maintenance of the Little Traverse Wheelway. The Wheelway is a world-class, 23 mile-long continuous paved bike trail that loosely follows the Little Traverse Bay shoreline from downtown Charlevoix, through the city of Petoskey, and into downtown Harbor Springs. Emmet County also maintains the 7.5 mile-long paved section of the North Western State Trail that was paved in 2012 and runs from M-119 to Alanson.

Emmet County EMS

Emmet County took control of its emergency medical services (EMS) on January 1st, 2015. Prior to 2015, these services had been contracted out to Allied EMS Systems, a private ambulance service company. The county has purchased ambulances and is in the process of building new permanent EMS stations. Primary goals of the newly established service are to decrease response times, improve first responder services, and control costs long-term.

Excerpt from March 5, 2015 Letter from Larry Hansen, Emmet County EMS Director:

"I am pleased to announce that we are in our third month of operations with the new Emmet County EMS system...Since Jan. 1, we have responded to more than 650 requests for an ambulance... The vision and commitment demonstrated by the Board of Commissioners and County officials has resulted in stability in emergency medical care services that will endure long-term... We have received comments from up in the northern part of the county that response times have improved, and responses to additional runs in the same vicinity ("second runs") have been equally timely."

City of Petoskey

The City of Petoskey has shown their commitment to transportation safety as one of the anchor participants on the Petoskey Area Transportation Committee (PATC) during its run from 2008 to 2013. Two major projects and multiple smaller projects originated in this committee. The two major projects were the 2013 Access Management project on US-31 (Mitchell Street) in Petoskey near McLaren Northern Michigan Hospital, and the Road Diet and Access Management portion of the 2015 US-31 (Charlevoix Avenue) project entering Petoskey from the west.

In addition, the city of Petoskey and other members of the PATC formed an Access Management Subcommittee and met quarterly for about three years. This subcommittee included representatives from the Northwest Michigan Council of Governments (now Networks Northwest), the City of Petoskey, Emmet County Planning and Zoning, and MDOT. The fruit of this subcommittee was that an Access Management Plan was created for the US-31 and M-119 corridors in and around Petoskey. As part of the 2013 Access Management project on US-31 (Mitchell Street), the City of Petoskey closed three city street intersections: Madison Street, Monroe Street, and Connable Avenue. Other intersections were modified and improved in the interest of safety and improved access to McLaren Northern Michigan Hospital. The concept for this project originated at the city and was brought forward through the PATC of which the LTBB was represented on. The Committee supported the project and allocated some funding from the leftover bypass study funds they were overseeing. Eventually, the project was funded through a partnership between MDOT and the City of Petoskey, with additional funds being supplied through the PATC.

DATA SUMMARY

Crash Data

Historical Perspective

It is important to note that transportation safety in the United States has improved significantly and steadily since the automobile was popularized in the early 20th century. These improvements should be applauded; however, there is still work left to be done.

In Michigan, a person was four times more likely to die in an automobile crash in 1940 than they are today. Even with increasing population and people driving much more than in the past, crashes have decreased—especially fatal crashes. These safety improvements can be attributed to some combination of: advances in automobile safety, roadway safety improvements, greater emergency response proficiency, progressive legislation, and a better educated driving populace.

Charts on right courtesy of Michigan Traffic Crash Facts website.

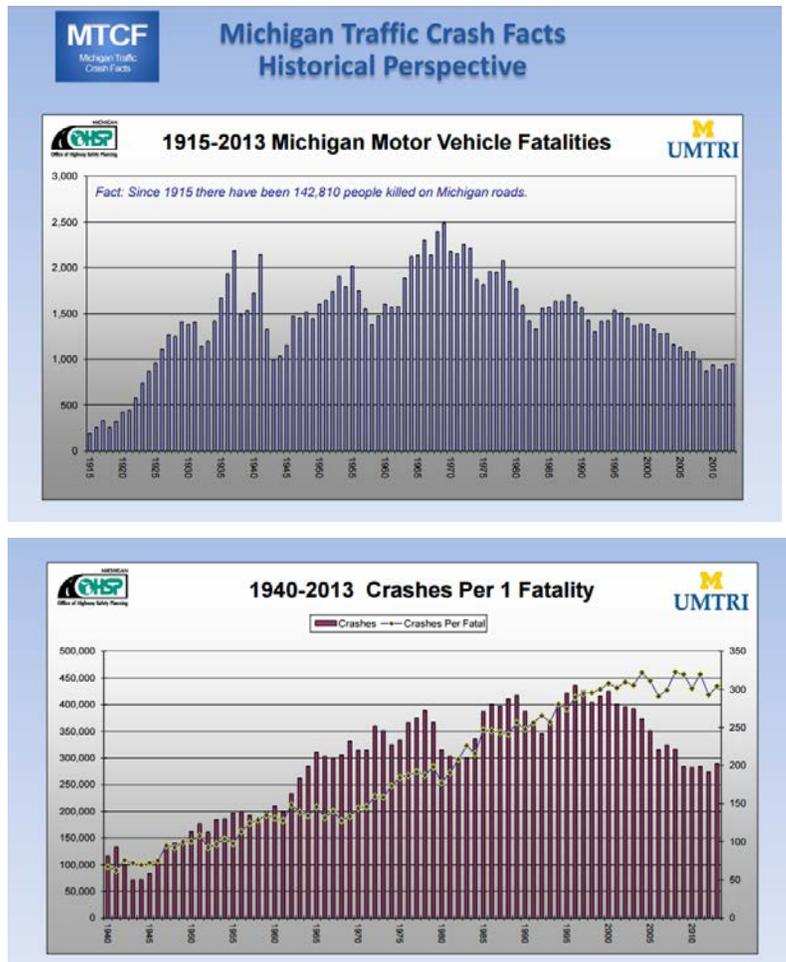


Figure 4 - Historical Perspective Data

Data Sources and Assumptions

As mentioned earlier, crash data was obtained through by utilizing Roadsoft and the MTCF website. Both Roadsoft and the MTCF website contain data from the Michigan State Police Traffic Crash Reporting System (TCRS) database. In Michigan, all law enforcement agencies are required to submit qualifying crash reports on form UD-10 to the Michigan State Police. The data from each field on the UD-10 forms is uploaded to TCRS by the Michigan State Police (MSP) and made available to federal, state, and local traffic safety partners.

Although the Little Traverse Bay Band of Odawa Indians 1855 Reservation boundary (outlined in yellow) encompasses parts of Emmet County and Charlevoix County, approximately 85% of the reservation area is located within Emmet County (highlighted in blue).

Roadsoft data is separated by county. Both Charlevoix and Emmet County crash data was obtained and used in this Tribal Transportation Safety Plan. However, in order to efficiently analyze safety trends, Emmet County crash data was used. Safety trends identified for Emmet County can be expected to apply for the LTBB reservation as well.

The MTCF website was developed by the University of Michigan Transportation Research Institute (UMTRI) for the Michigan State Police Office of Highway Safety Planning. The website has a data query tool that allows a user to search aggregate UD-10 data statewide. The data can be filtered by many different categories such as location, crash type, crash involvement, driver characteristics, time of day, etc. The MTCF data query tool was used during the preparation of this Tribal Transportation Safety Plan (TTSP) to obtain statewide statistics for reference and comparison to local statistics.

Roadsoft is a GIS-based software developed by Michigan Technological University's Center for Technology and Training (CTT) for local road agencies. . As such, the maps and data searching capabilities are separated by county. Roadsoft contains the same data from the MSP's

Traffic Crash Reporting System database, but with even more capabilities than the MTCF data query tool. Roadsoft allows the user to download a redacted copy of the actual UD-10 crash report where the details of a particular crash can be analyzed. In addition, the GIS functionality of Roadsoft allows crashes to be displayed accurately on a map, along with roads and other features. Crash data is available as far back as 2004.

Figure 5 - Data Sources



Figure 6 - Transportation Program Map

Statewide vs. Emmet County Crashes

The crash data for Emmet County was compared to the crash data for the state as a whole in order to identify any safety trend anomalies that might exist in the local area.

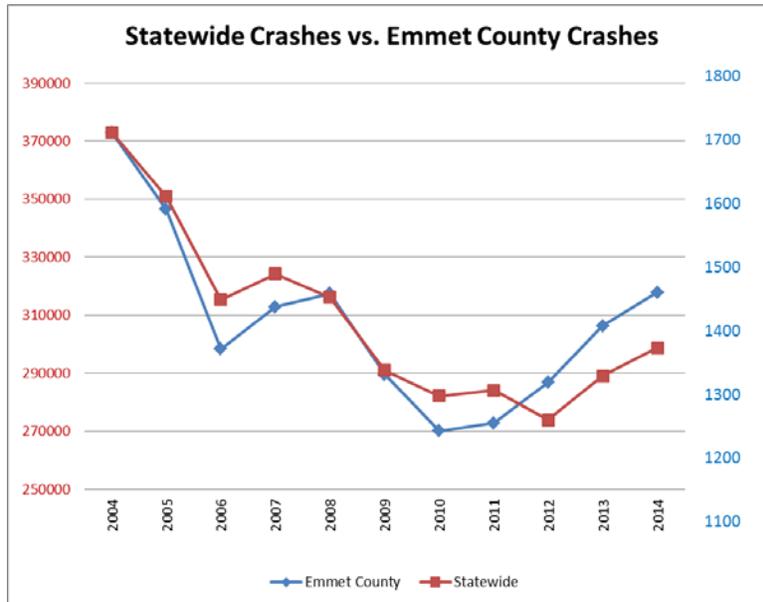


Figure 7 - Statewide Crashes vs. Emmet County Crashes

The results showed a fluctuation in the total number of crashes that is significant, but was similar to the fluctuation in total crashes that occurred over the same time period statewide. It was interesting to note that the total number of crashes seems to have been trending downward until 2011-2012 when the trend seemed to begin to take an up-turn. Crashes actually increased by approximately 10 percent in the last 2-3 years both statewide and in Emmet County.

Statewide vs. Emmet County Traffic Volumes

Suspecting that the up-turn in traffic crashes might be due to the natural increased likelihood of crashes when more vehicles are on the roads, traffic volumes were compared for the same time frame. Historical statewide traffic volumes were obtained from the MTCF website for this time period. Historical traffic volumes for Emmet County were not readily available, so an estimate of traffic volumes was done using MDOT traffic estimates was performed. MDOT has historical traffic count information available for the state highways in Emmet County on their Traffic Monitoring Information System (TMIS). This information was tabulated and the percent change in traffic volumes was compared for Emmet County and the state as a whole.

The result of this comparison indicated that the traffic volumes changed similarly statewide and locally over the last ten years. However, no correlating traffic increase was present to indicate that increased traffic might be the cause of the 10% increase in crashes since 2011-2012. No explanation for the increase in crashes was found.

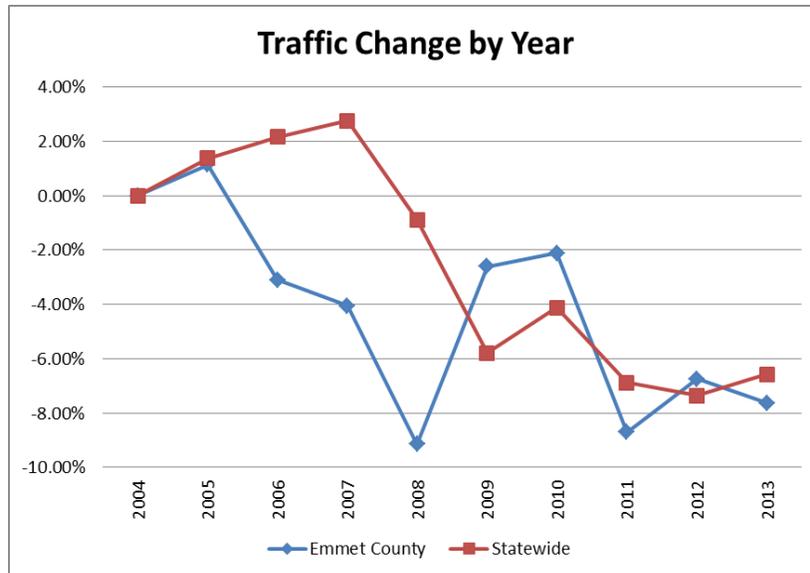


Figure 8 - Traffic Change By Year

Emmet County vs. Statewide Serious Injury and Fatal Crashes

The statewide fatal and serious injury crash data was compared to the same for Emmet County, again looking for anomalies. This comparison revealed that Emmet County had a significant drop in the number of fatalities and serious injuries in 2012 and 2013, but rose back to “normal” in 2014. More importantly, although the number of crashes (statewide and local) has increased by 10 percent since 2011-2012, the serious injuries and fatalities steadily decreased since that time.

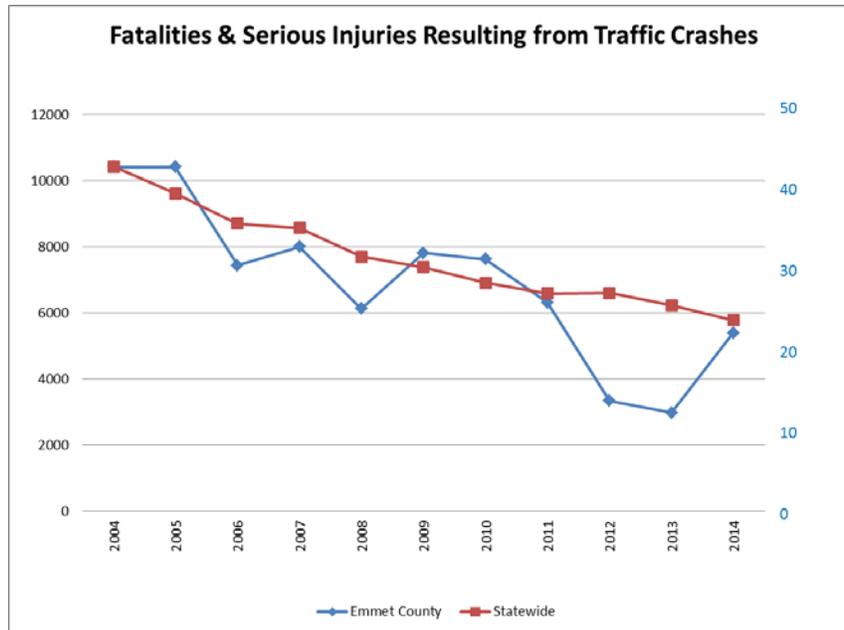


Figure 9 - Fatalities & Serious Injuries Resulting From Traffic Crashes

Serious Injury and Fatal Crashes by Road Jurisdiction

The significant drop in Emmet County traffic fatalities and serious injuries in 2012 and 2013 prompted a comparison by roadway jurisdiction to see if the drop could be attributed to state highways, city streets, or county roads. The result of this comparison indicated that the drop in fatalities and serious injuries in 2012 and 2013 was not due to a drop in a particular jurisdiction.

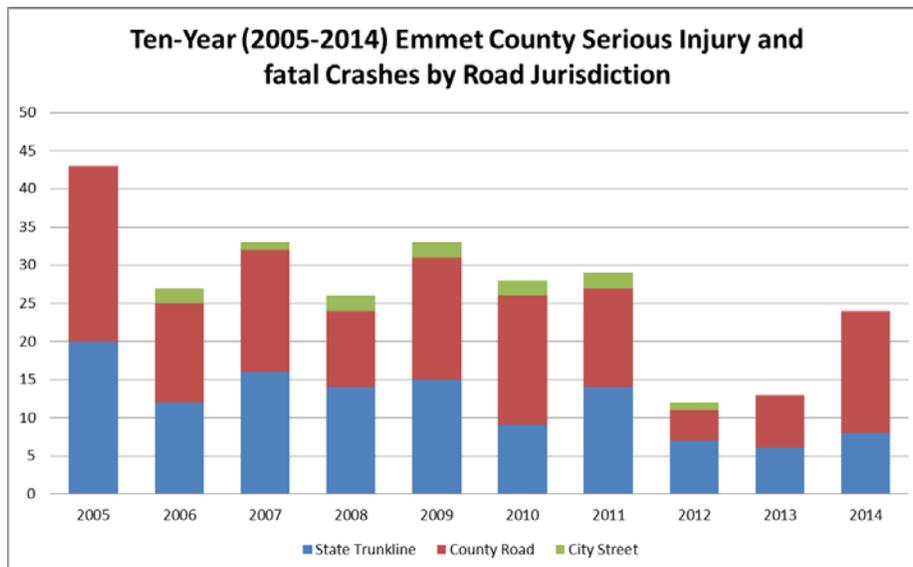


Figure 10 - Ten Year Emmet County Serious Injury and Fatal Crashes by Road Jurisdiction

A comparison of the previous two five-year averages, however, does indicate that the share of fatalities and serious injuries that occur on county roads in Emmet County is increasing. The number of serious injury and fatal crashes has decreased across the board when comparing the 2005-2009 five-year average and the 2010-2014 five-year average, but the reduction on state trunklines has outpaced that of the local roads.

Serious Injury and Fatal Crashes			
Five-Year Average from:	State Trunklines	County Roads	City Streets
2005-2009	77	78	7
2010-2014	44	57	5

Figure 11 - Serious Injury and Fatal Crashes

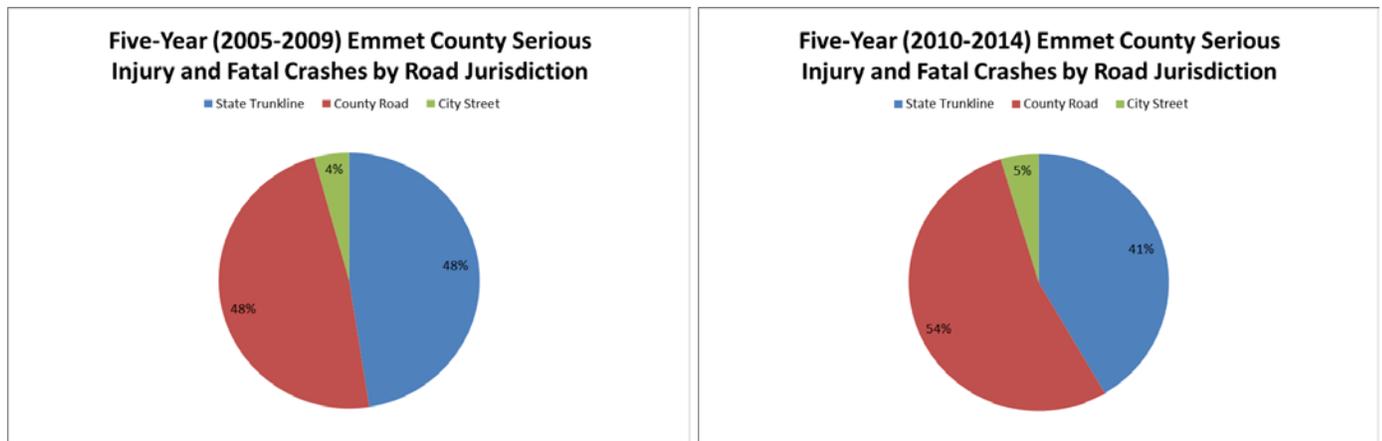


Figure 12 - Breakdown Chart of Five Year Comparison

Emmet County vs. Statewide Alcohol Involvement

It is well-known that alcohol plays a role in traffic deaths and serious injuries. The instance of alcohol involvement in fatal and serious injury crashes in Emmet County was compared to the statewide rate. The rate of alcohol involvement over the past five years in these types of crashes was found to be slightly less locally than statewide.



Figure 13 - Five Year Review Reflecting Alcohol Involvement

Effect of Weather on Emmet County Crashes

Weather plays a role in traffic crashes on the LTBB reservation. Winters are long and the area receives an average of over 100 inches of snow annually, which makes for long periods of slippery roads. In order to analyze the impact that weather has on transportation safety on the reservation, crashes were looked at by month.

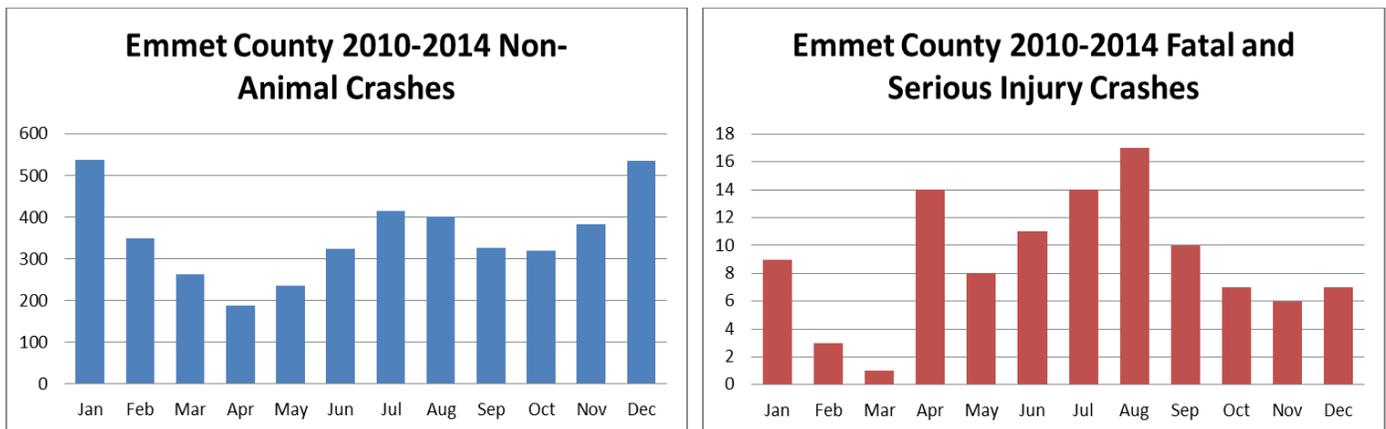


Figure 14 - Weather/Animal Related Crashes

Animal crashes were removed from the data for this comparison since they tend to spike during the fall hunting season and would skew the data relative to weather. The data shows that while crashes are highest during the winter months, these are some of the lowest months for the occurrence of serious injuries and fatalities. Fatalities and serious injuries are occurring more in the warmer months.

In addition to analyzing crashes by time of year, an analysis based on pavement condition at the time of the crash was also conducted. This analysis showed that while the number of crashes on dry pavement vs. other road conditions (icy, snowy, muddy, etc.) was about 50-50, serious injury and fatal crashes happened on dry pavement 70% of the time.

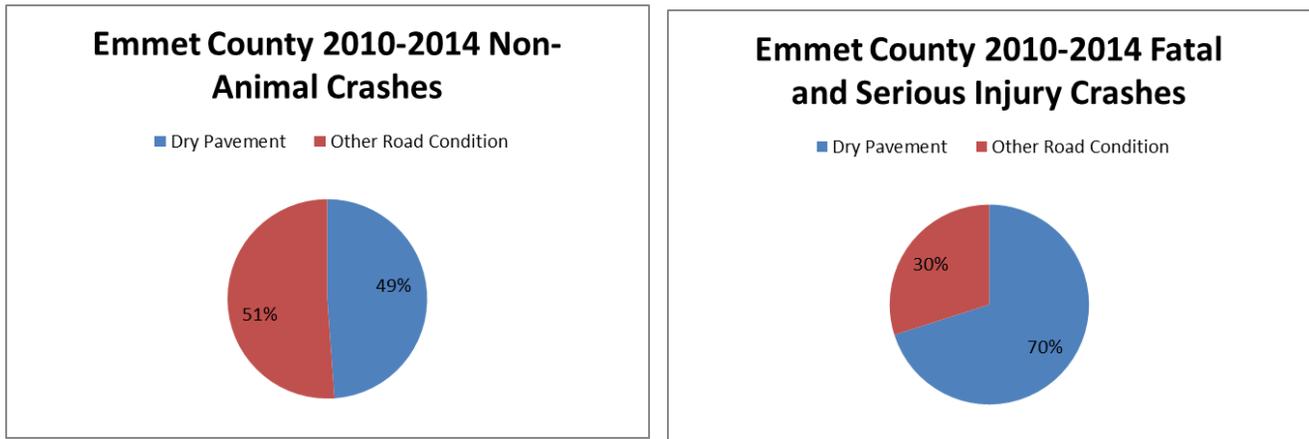


Figure 15 - Weather/Animal Related Crashes Percentage

Effect of Lighting on Emmet County Crashes

The number of crashes occurring after dark was analyzed for all crashes as well as serious injury and fatal crashes.

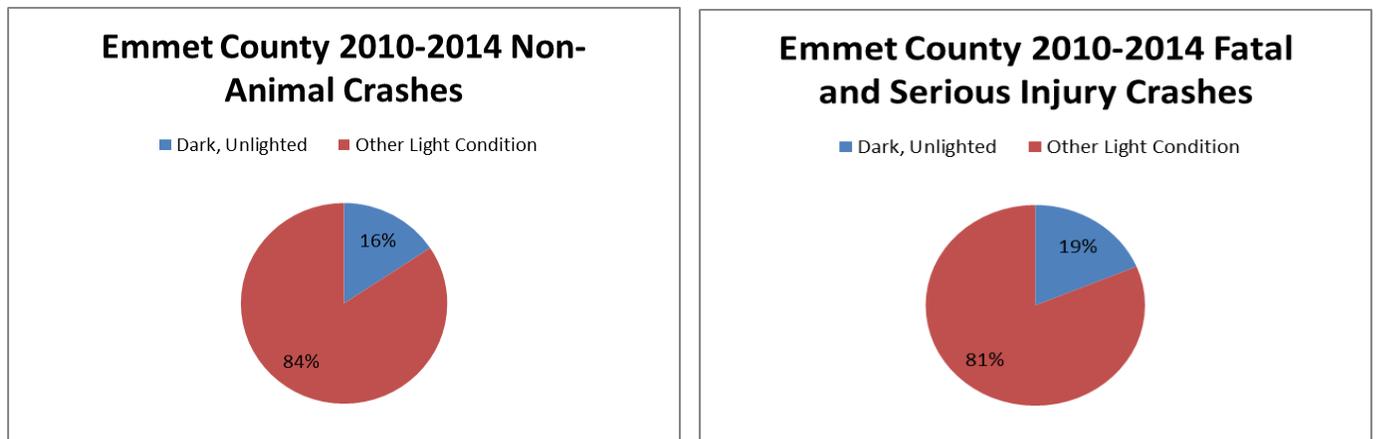


Figure 16 - After Dark Related Crashes

The analysis showed that less than 20 percent of crashes happened in the dark, and a slightly higher percentage of serious injury and fatal crashes happened in the dark when compared to all non-animal crashes.

Lane Departure Crashes in Emmet County

An analysis was conducted to look at crashes involving a vehicle leaving the roadway, termed “lane departure” crashes, of which 51 people have been seriously hurt or killed in Emmet County over the past five years. Analysis showed that 34 percent of all non-animal crashes in Emmet County over the past five years involved lane departure, while 48 percent of serious injury and fatal crashes involved lane departure.

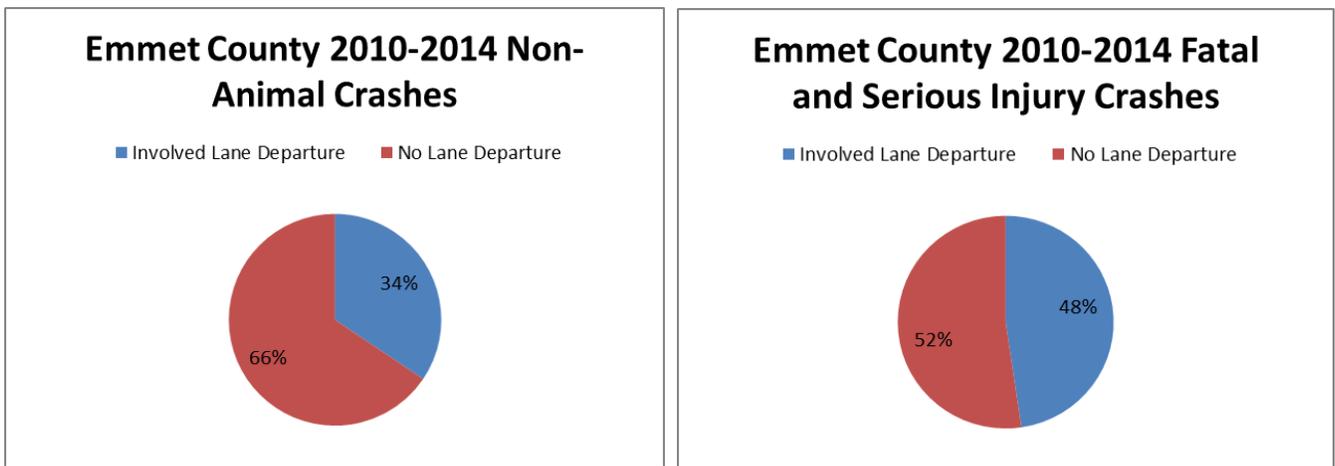


Figure 17 - Lane Departure Crashes

As a comparison, lane departure crashes accounted for only 22 percent of non-animal crashes and 39 percent of serious injury and fatal crashes statewide between 2010 and 2014.

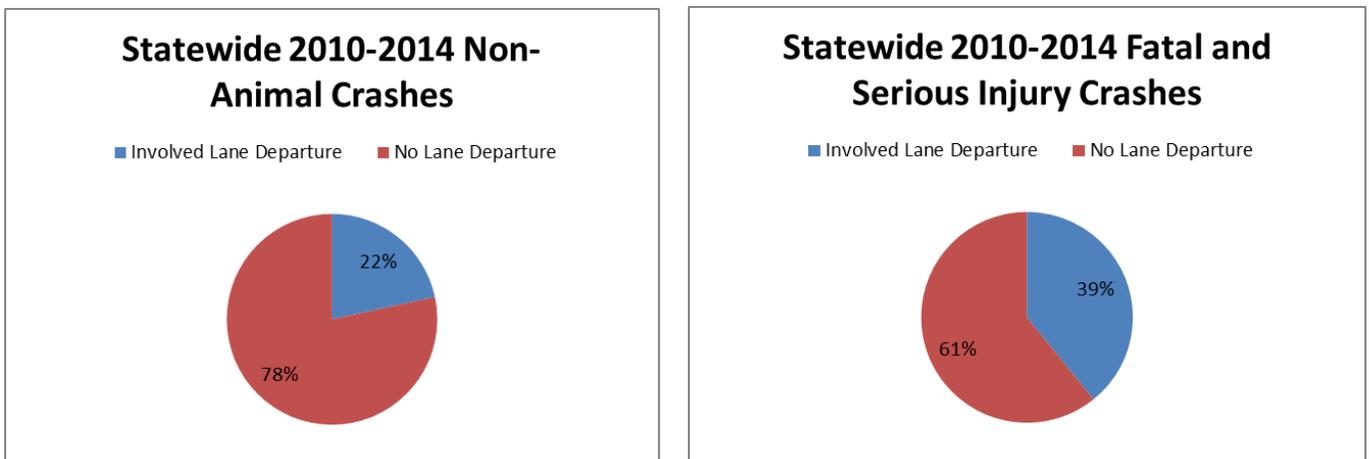


Figure 18 - Statewide Lane Departure Crashes

The data shows that lane departure crashes are more highly represented in Emmet County than they are statewide, and that these crashes result in more serious injuries and fatalities than the “average crash”.

Emmet County Crashes on Curves

Twenty people have been seriously injured, and six people have been killed in 23 curve-related crashes in Emmet County over the past five years.

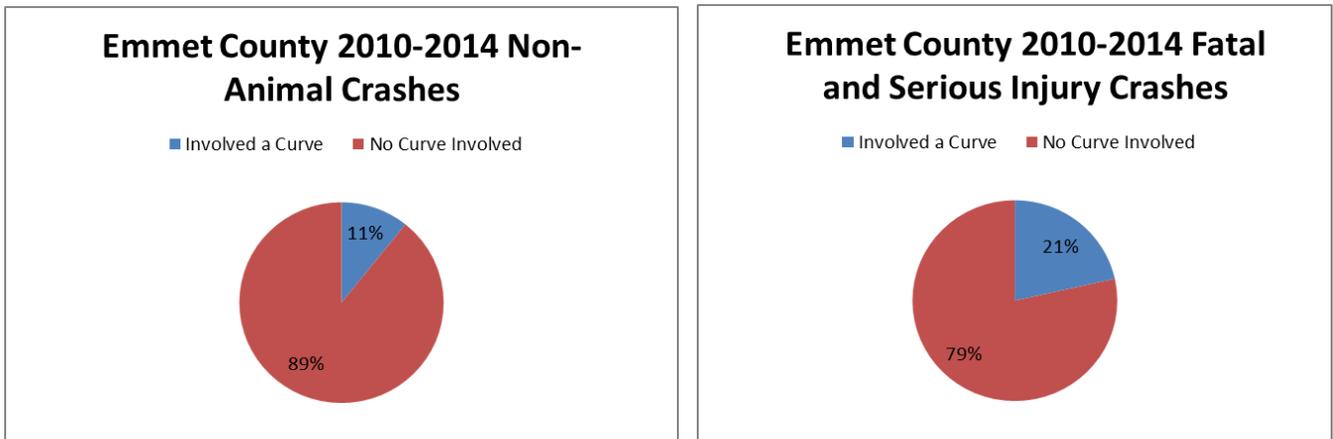


Figure 19 - Emmet County Crashes on Curves



Figure 20 - Statewide Crashes on Curves

An analysis of curve-related crashes showed that 11 percent of all non-animal crashes in Emmet County over the past five years involved a vehicle travelling on a curve, while 21 percent of serious injury and fatal crashes involved a vehicle on a curve.

By comparison, curve-related crashes accounted for only 5 percent of non-animal crashes and 9 percent of serious injury and fatal crashes during the same time period statewide.

The data for curve-related crashes shows that they are represented twice as often in Emmet County than they are statewide, and that these crashes result in more serious injuries and fatalities than the “average crash”.

Intersection Crashes in Emmet County

Data was collected regarding intersection crashes in Emmet County, in which 53 people have been seriously hurt or killed in over the last five years. The data showed that 59 percent of non-animal crashes in the previous five-year period occurred in an “intersection area” (within 150 feet of an intersection), while only 50 percent of serious injury and fatal crashes happened in an “intersection area”. This indicates that county-wide, intersection accidents are less severe than the “average crash”.

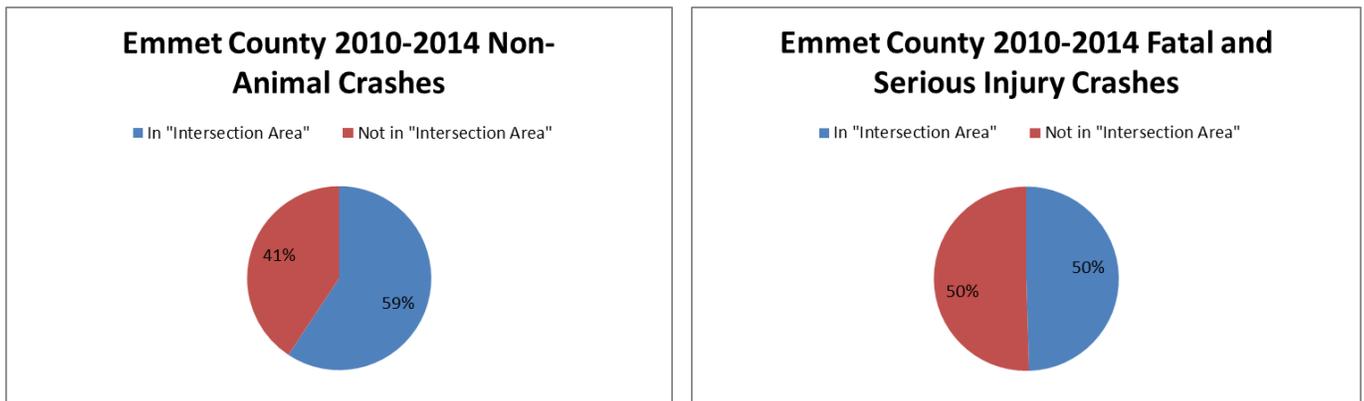


Figure 21 - Emmet County Intersection Crashes

The intersection crash data was further parsed into two groups, 1) those occurring on high-speed roadways with a 55 mph speed limit, and 2) those occurring on all other roads. The data for high-speed roadways showed that crashes that occurred in high-speed intersection areas were more severe than the “average crash”.

The data for non-high-speed roadways showed that crashes that occurred in these intersection areas were less severe than the “average crash”.



Figure 22 - Emmet County Crashes, Speed Limit 50 or Less

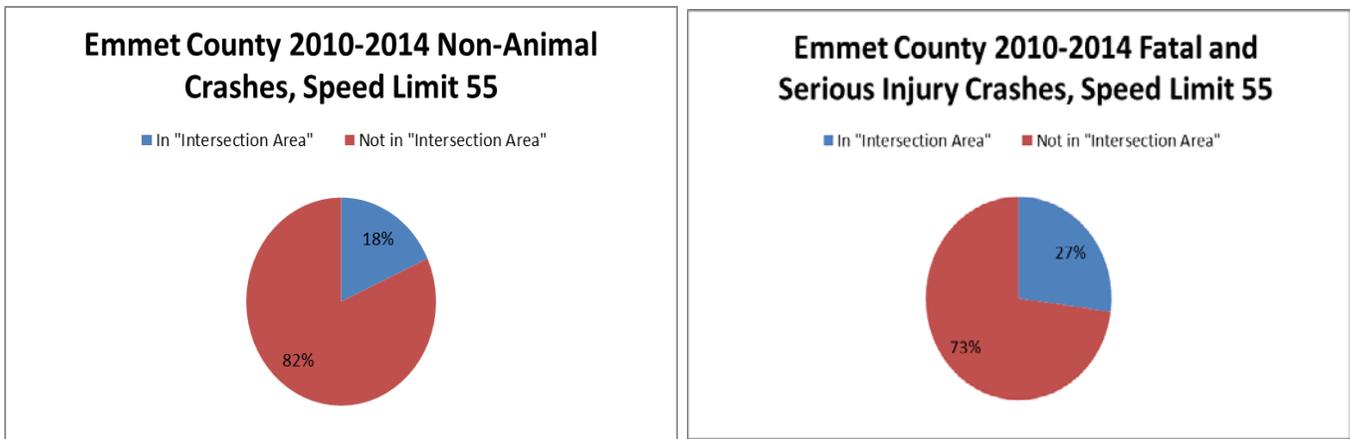


Figure 23 - Emmet County Crashes, Speed Limit 55

It was not possible to query the crash data based on the proximity of a traffic signal, but the high instance of less-severe crashes at non-high-speed intersections is likely due to the presence of them. Traffic signals often cause a relatively high amount of crashes that low severity.

Pedestrian and Bicycle Crashes in Emmet County

Pedestrian and bicycle crashes in Emmet County were analyzed and compared to statewide statistics for the same types of crashes. Four pedestrians or bicyclists were killed or seriously injured in Emmet County between 2010 and 2014.

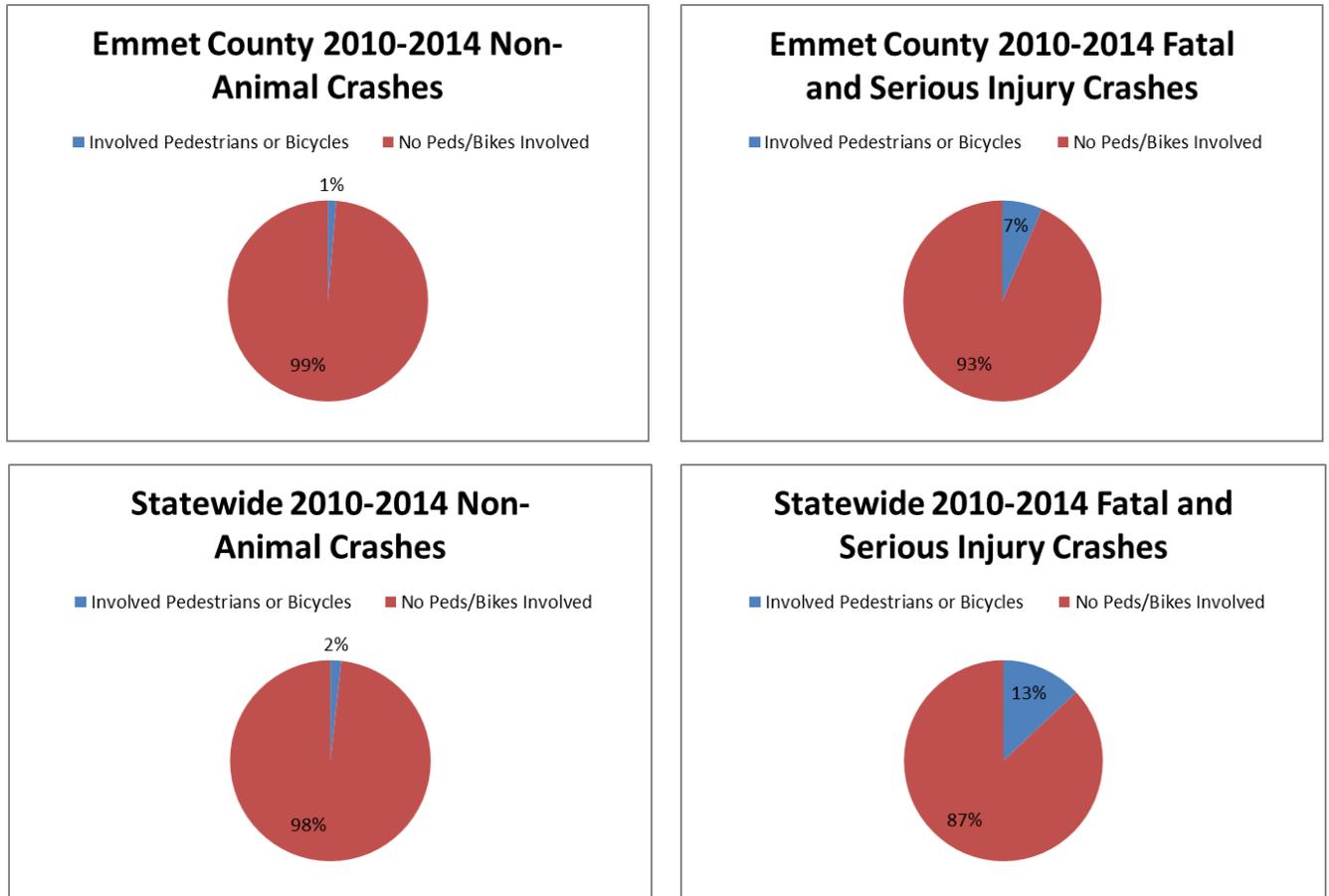


Figure 24 - Emmet County / Statewide Pedestrian and Bicycle Crashes

The analysis showed that crashes involving a pedestrian or bicyclist were significantly less represented (about half as much) in the Emmet County data than for the state as a whole. As would be expected, the data also showed that crashes involving these vulnerable transportation system users are much more likely (seven times as much) to result in a fatality or serious injury than the “average crash” would.

Motorcycle Crashes in Emmet County

Lastly, crash data involving a motorcycle was collected and analyzed for both Emmet County and the state as a whole.

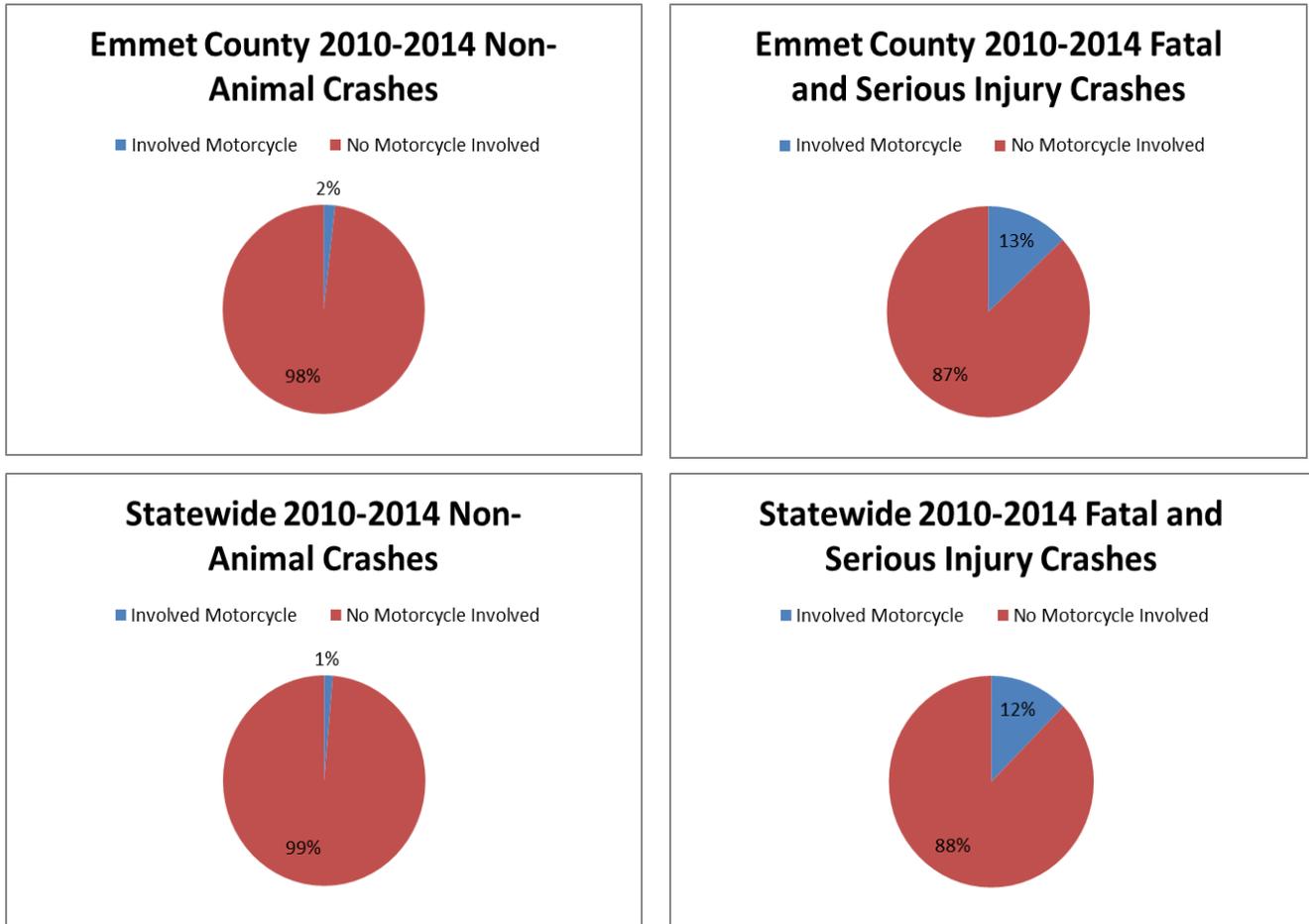


Figure 25 - Emmet County / Statewide Motorcycle Crashes

Fourteen motorcyclists were found to have been seriously hurt or killed in motorcycle crashes during the five years from 2010 to 2014. The analysis of motorcycle crashes showed that crashes involving a motorcyclist in Emmet County were similarly represented in Emmet County as compared to the state as a whole. As would be expected, the data also showed that crashes involving these high-speed and physically vulnerable system users are much more likely to result in a fatality or serious injury than the “average crash” would.

In 2012, Michigan’s mandatory helmet law for motorcycles was repealed. Motorcycle crashes were analyzed to see what effect, if any, this repeal has had on motorcycle crash severity.

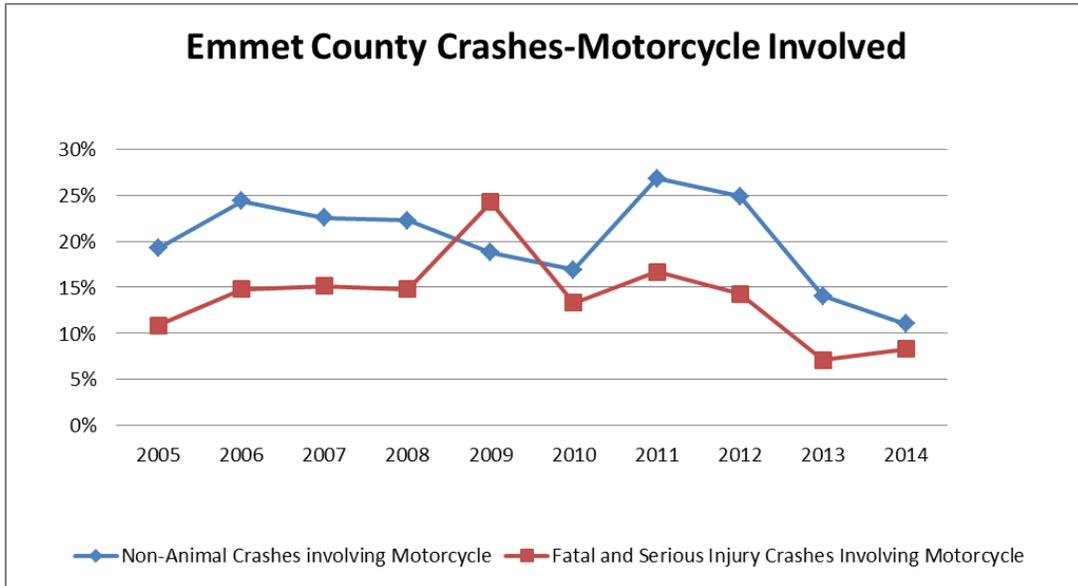


Figure 26 - Emmet County Crashes - Motorcycle Involved, Helmet Law

The result of this analysis was that the repeal of the helmet law has not substantially altered the rate of severe injuries and fatalities from motorcycle crashes, at least for Emmet County.

Snowmobile Crashes in Emmet County

Three people were seriously hurt or killed in eighteen reported snowmobile crashes in Emmet County between 2010 and 2014. An analysis of snowmobile crashes showed that the rate of snowmobile crashes as well as serious injuries and fatalities is high in Emmet County as compared to the statewide average. Emmet County’s annual snowfall and extensive snowmobile trail system makes it attractive to snowmobilers.

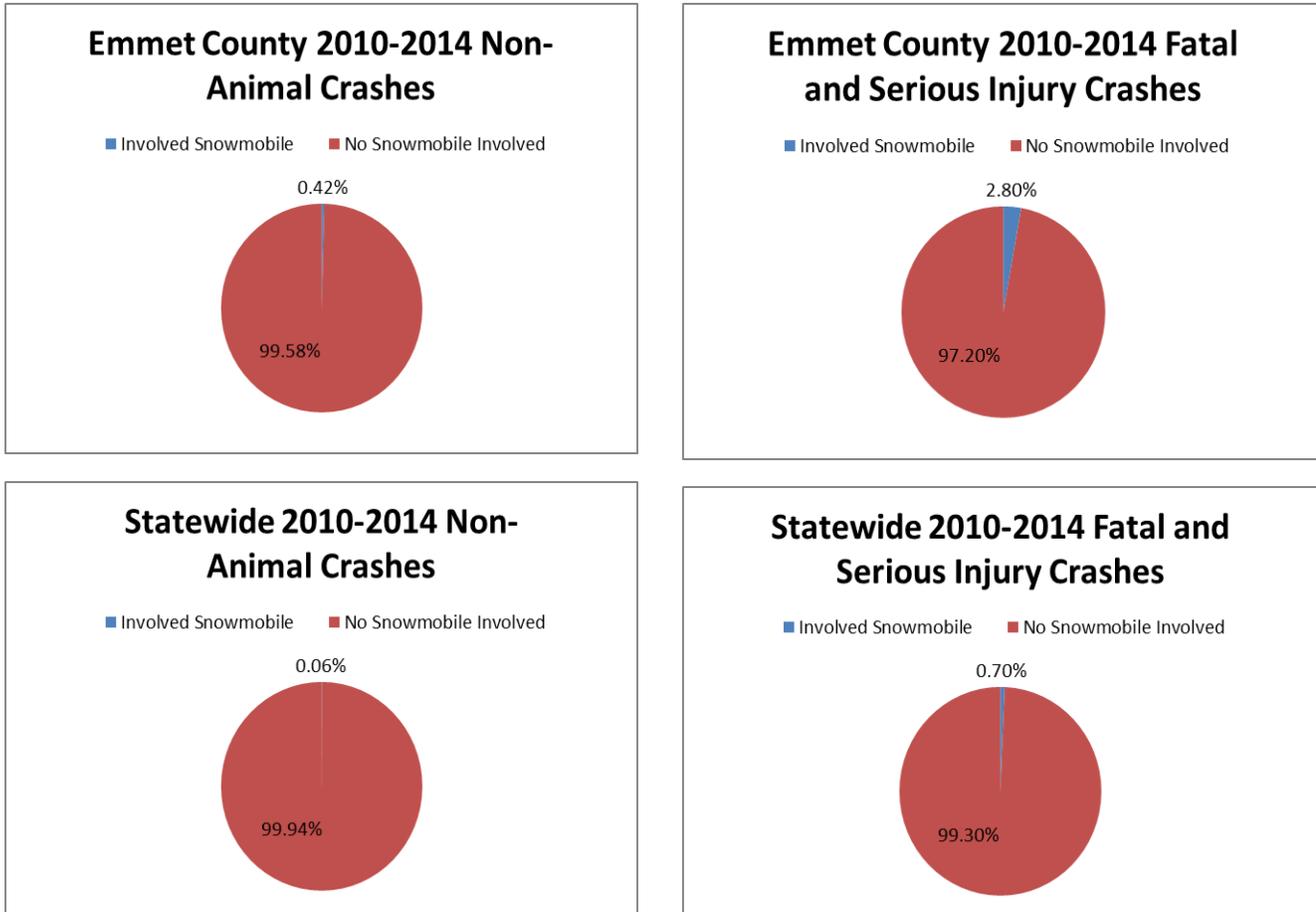


Figure 27 - Emmet County / Statewide Snowmobile Crashes

Other data

Besides the crash data that has been listed in detail in the previous section, other qualitative data has been acquired from various sources during the course of data collection and are listed here. The safety concerns listed in this section may or may not be included in other areas of the plan as well.

Pickeral Lake Road and US-31 Intersection

During data collection for this Tribal Transportation Safety Plan, this intersection was identified by the LTBB Planning Department Mobility Coordinator, Amanda Swiss, as well as by the North Central Michigan College President Cameron Brunet-Koch as being a high priority. The intersection is a few hundred feet from LTBB tribal property, being the LTBB Planning Department office.

This intersection was identified in the 2008 Petoskey Area Transportation Study as being an intersection in need of improvement such as a traffic signal or other improvement, and was subsequently placed on the priority list of the Petoskey Area Transportation Committee. In 2006, a center left-turn lane was constructed on US-31 which alleviated most of the accidents that were occurring at the intersection due to rear-end left-turn crashes. However, right-turn lanes were also added at that time and as a result, the intersection has become overly wide. This, compounded with the severe skew of the intersection has made entering the highway from the side road at this intersection increasingly daunting. At least one severe accident has occurred at this intersection since 2006 and the general feeling among people in the area is that another severe accident is imminent.

Curve on Lears Road Exit from Odawa Casino

This curve was identified during the data collection phase of the TTSP in a discussion with the LTBB Police Chief. Chief Jeff Cobe indicated that the 90-degree curve on the boulevard exit from the casino to Lears Road is a potential safety hazard. He indicated that the curve is fairly sharp and has guardrail on the outside of the curve. He said that the guardrail is behind the curb and is installed relatively low. He thought that if a vehicle were to hit it with any amount of speed, there would be a possibility of clearing the guardrail and entering the ravine behind it.

Pedestrian and bicycle traffic in Petoskey

This issue was brought up by the Petoskey Director of Public Safety. Director John Calabrese indicated that he has gotten at least two complaints about bicycle safety in Petoskey from a tribal member. Mr. Calabrese said that in the winter, bicycles end up riding in the travel lanes because there is no separated paths that are cleared of. He indicated that both bicycle (in the winter especially), and pedestrian safety all year-round, are a concern within the city of Petoskey.

Lower Shore Drive (South) from M-119 north 1,000 feet

This stretch of road was identified by the Emmet County Road Commission Manager, Brian Gutowski, who explained how the road is on a steep incline and that the slope is slowly slipping down the bluff. He said that the edge of the road toward Lake Michigan is nearly vertical. If a solution to stabilize the slope is not implemented, this road and slope could catastrophically fail.

Lears Road at Howard Road Intersection

At the public meeting, this intersection was brought up, particularly the left turn from eastbound Lears Road onto Howard Road. Limited sight distance there makes this movement difficult and potentially dangerous.

Cedar Valley at Greenwood Road Intersection

Also at the public meeting, this intersection was brought up due to the two-way stop condition. Due to limited sight distance, stop-sign running has been experienced at this intersection.

Resort Pike at Intertown Road Intersection

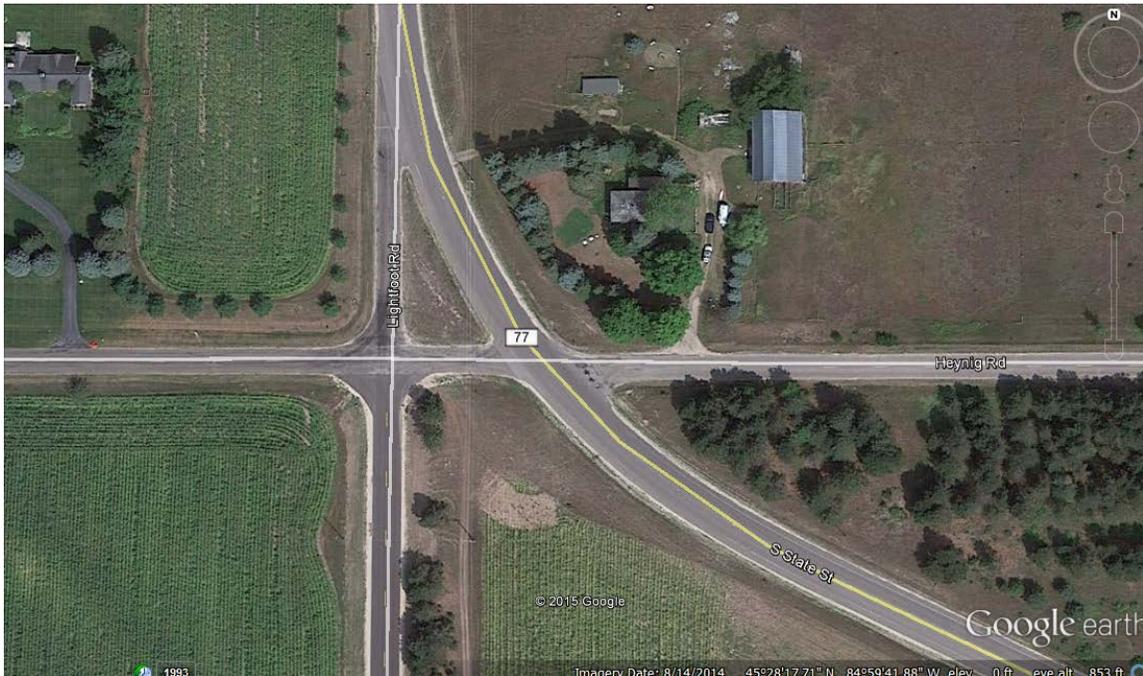
This intersection was identified by Mr. Gutowski as one of the two intersections that have created the most complaints to the Road Commission about safety.

Pleasantview at Van Road Intersection

This is the other top safety-complaint accumulating intersection as reported by Mr. Gutowski.

Intersections with Poor Geometry and/or Sight Distance

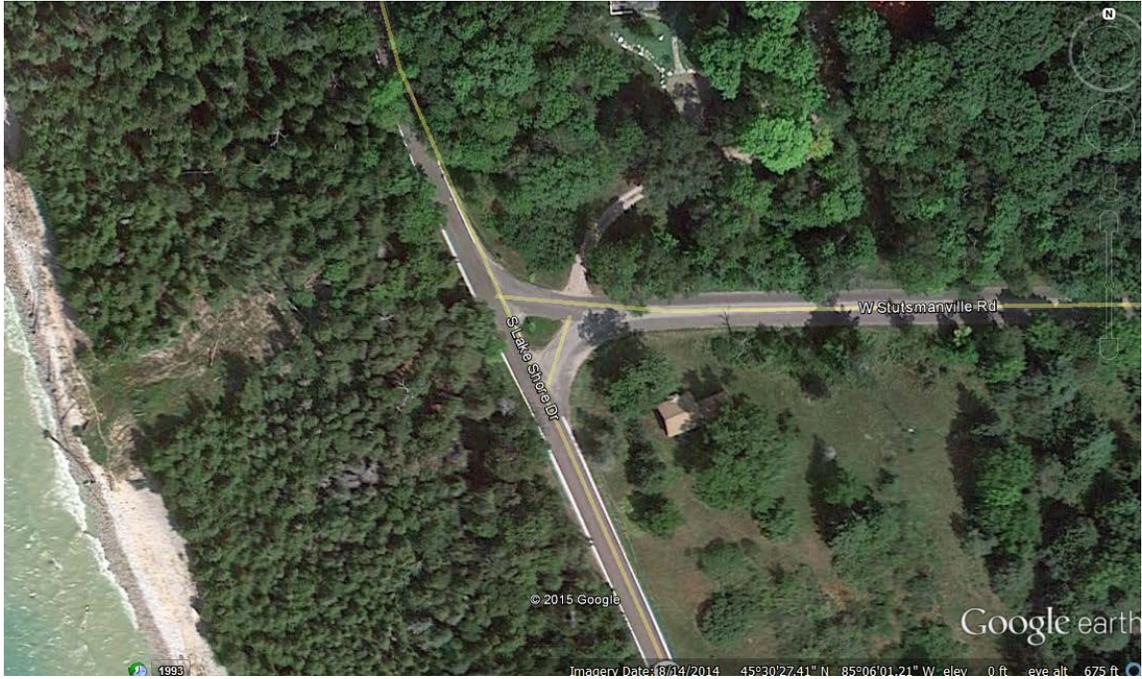
The following intersections were also identified by Mr. Gutowski, who said that these intersections are on curves that have two roads that connect to the main road at the start of each curve, causing sight-distance issues and the potential for head-on collisions. Mr. Gutowski indicated that these intersections need to have the two roads eliminated and reduce the intersection to one perpendicular to the main road mid-way on the curve.



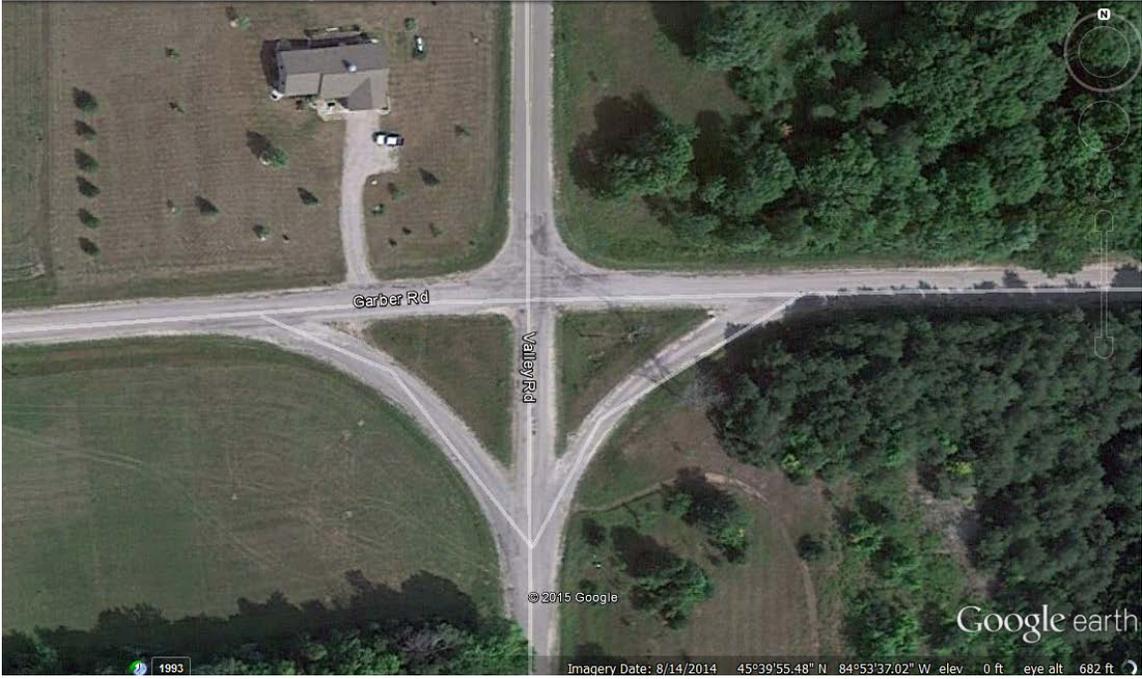
Picture 1 - State Road at Heynig Road ad Lightfoot Road



Picture 2 - State Road at Wormwood Road



Picture 3 - Stutsmanville Road at M-119



Picture 4 - Valley Road at Garber Road

EMPHASIS AREAS

Emphasis Area #1: Intersections

Analysis of the crash data for Emmet County indicated that half of the 112 serious injury and fatal crashes that occurred during the five-year period from 2010 to 2014 took place within 150 feet of an intersection. The prevalence of serious injuries and fatalities occurring near intersections makes them an obvious target as an emphasis area. Intersection crashes have been identified in the State of Michigan's Strategic Highway Safety Plan as an emphasis area as well; where they indicated that such crashes resulted in 200 fatalities (22.5 percent of the statewide total) between 2007 and 2011¹⁰. More than 20 percent of all traffic fatalities in the United States occur at intersections and over 80 percent of intersection-related fatalities in rural areas occur at unsignalized intersections¹¹.

Intersections: Objective

The objective is to create a list of 20 priority intersections and address 50% of the list within the next five years.

Strategies for Improving Safety at Un-signalized Intersections

The strategies below range from very low cost and fast implementation time to more costly and more planning required. The low-cost strategies should be considered first.

- Install transverse rumble strips
- Clear sight triangle of obstructions (mainly trees)
- Enhanced signing
- Enhanced pavement markings
- Improve visibility of the intersection by providing lighting
- Install flashing beacons, either sign-mounted or overhead
- Construct turn lanes
- Construct passing flares at T-intersections
- Realign skewed intersections
- Change horizontal and/or vertical alignment in order to improve sight distance
- Install roundabout intersection

¹⁰ Governor's Traffic Safety Advisory Committee, "State of Michigan Strategic Highway Safety Plan 2013-2016"

¹¹ USDOT, Federal Highway Administration, "Intersection Safety: A Manual for Local Rural Road Owners"

Strategies for Improving Safety at Signalized Intersections

Again, these strategies should be considered roughly in the order listed, from least to most costly.

- Signal timing changes, including night flash schedule
- Enhanced pavement markings
- Enhanced traffic signing
- Clear sight triangle of obstructions (vegetation, signs, etc.)
- Increased traffic signal visibility, such as additional signal heads or reflective back plates
- Retro-fitting of traffic signal to allow for vehicle detection
- Retro-fitting of traffic signal to allow for pedestrian detection
- Install or reconstruct sidewalk ramps
- Modernize entire traffic signal, reconfigure as box-span
- Construct additional turn lanes
- Install roundabout intersection

Intersection Safety Rankings

Intersection safety rankings have been created in order to prioritize intersection improvement efforts in and around the LTBB reservation and tribal population areas. The study area for the rankings encompasses all of Emmet County, as well as the portion of the reservation that lies within Charlevoix County.

Intersections within the study area were first ranked in order by the total number of crashes experienced at each.

Intersections: Top 20 Total Crashes 2010-2014				
Intersection	Jurisdiction	City/Township	County	Total Crashes
W Mitchell St & Spring St & Charlevoix Ave	MDOT*	Petoskey	Emmet	67
M 119 & US 31	MDOT*	Bear Creek Twp	Emmet	65
Spring St & US 131 & Anderson Rd	MDOT*	Petoskey	Emmet	60
US 131 & Lears Rd	MDOT*	Bear Creek Twp	Emmet	52
US 31 & Glen's Shopping Center/Rice St/Kent Rd	MDOT*	Bear Creek Twp	Emmet	51
Spring St & W Sheridan St	MDOT*	Petoskey	Emmet	49
W Mitchell St & Wachtel Ave	MDOT	Petoskey	Emmet	43
N Division Rd & S Division Rd & Mitchell Rd	ECRC*	Bear Creek Twp	Emmet	41
W Lake St & E Lake St & Bay View Rd	MDOT*	Petoskey	Emmet	37
W Mitchell St & Ingalls Ave	MDOT**	Petoskey	Emmet	31
Pine River Ln & Bridge St	MDOT***	Charlevoix	Charlevoix	28
Anderson Rd & Lears Rd	ECRC/LTBB*	Bear Creek Twp	Emmet	27
US 31 & N Division Rd	MDOT	Bear Creek Twp	Emmet	27
Bay View Rd & MacDonald Dr	MDOT*	Petoskey	Emmet	27
M 119 & W Conway Rd	MDOT*	Little Traverse Twp	Emmet	25
Madison St & W Mitchell St	MDOT****	Petoskey	Emmet	25
Beaubien St & Bay View Rd	MDOT	Petoskey	Emmet	24
Petoskey Ave & Mercer Blvd	MDOT	Charlevoix	Charlevoix	22
Chicago St & M 68 & US 31 & S Burr Ave	MDOT*	Alanson	Emmet	22
Charlevoix Ave & McDowell St	MDOT	Petoskey	Emmet	22

* Signalized Intersection ** Signal installed in 2013
*** Drawbridge signal **** Signal removed in 2013

Figure 28 - Intersections: Top 20 Total Crashes 2010-2014

The list of total crashes is heavily populated with signalized intersections, since they tend to cause a high number of traffic crashes, usually of low severity. This ranking assumes the same weight for a low severity crash as for a fatal crash. The ranking tells a story, but not the only story. Another ranking of the intersections in the study area was created based on the number of fatalities and serious injuries that occurred at each intersection as the primary ranking, and number injured as the secondary ranking.

Intersections: Top 20 Serious Injuries or Fatalities 2010-2014							
Intersection	Jurisdiction	City/Township	County	Total Crashes	Number Injured	Number of Fatalities	Serious Injuries or Fatalities
Intertown Rd & US 131	MDOT	Bear Creek Twp	Emmet	19	8	1	3
W Mitchell St & Ingalls Ave	MDOT**	Petoskey	Emmet	31	7	0	3
Intertown Rd & Cemetery Rd	ECRC	Bear Creek Twp	Emmet	8	4	0	3
US 131 & Williams Rd	MDOT	Bear Creek Twp	Emmet	9	3	0	3
US 131 & W Gruler Rd	MDOT	Bear Creek Twp	Emmet	4	3	0	3
Greenwood Rd & Cedar Valley Rd	ECRC	Bear Creek Twp	Emmet	1	3	0	3
US 131 & Lears Rd	MDOT*	Bear Creek Twp	Emmet	52	15	0	2
N Division Rd & Country Club Rd	ECRC	Bear Creek Twp	Emmet	17	5	0	2
Charlevoix Ave & Resort Pike Rd	MDOT	Petoskey	Emmet	21	4	0	2
Charlevoix Ave & Arrowhead Dr	MDOT	Petoskey	Emmet	14	4	0	2
Charlevoix Ave & Blackbird Rd	MDOT	Petoskey	Emmet	8	4	0	2
Petoskey Ave & Lewis St	MDOT	Charlevoix	Charlevoix	6	2	0	2
US 31 & Nine Mile Point Dr	MDOT	Hayes Twp	Charlevoix	3	2	0	2
Charlevoix Ave & Hillside Dr	MDOT	Petoskey	Emmet	2	2	0	2
Deer View Ln & S Division Rd & Cedar Ridge Dr	ECRC	Bear Creek Twp	Emmet	1	2	0	2
N Mackinaw Hwy & Paradise Trl	ECRC	Carp Lake Twp	Emmet	1	1	1	2
W Mitchell St & Spring St & Charlevoix Ave	MDOT*	Petoskey	Emmet	67	12	0	1
Spring St & US 131 & Anderson Rd	MDOT*	Petoskey	Emmet	60	10	0	1
N Division Rd & S Division Rd & Mitchell Rd	ECRC*	Bear Creek Twp	Emmet	41	8	0	1
M 119 & W Conway Rd	MDOT*	Little Traverse Twp	Emmet	25	7	0	1

Figure 29 - Intersections: Top 20 Serious Injuries or Fatalities 2010-2014

The ranking based on fatalities and serious injuries only considers crashes that cause a serious injury or fatality, which tells another part of the intersection story, but leaves out all of the low-severity crashes.

Next, the intersections in the study area were ranked based on the Equivalent Property Damage Only (EPDO) that was experienced at each. Injuries to crash victims are categorized into one of five severities by the responding police officers and listed on the UD-10 crash report. The severities are as follows ranking is called the KABCO scale where K indicates someone was killed, A indicates a serious

injury to the victim, B indicates an apparent injury, C indicates a possible injury, and O indicates no injury or “Property Damage Only (PDO)”.

For the purpose of ranking the intersections in the study area based on EPDO, accident costs were assigned for each injury severity experienced in the associated crashes.

Accident Costs		
Type of Injury	Cost	Equivalent Property Damage Only (EPDO)
Fatality (K)	\$1,500,000 *	230
Incapacitating (A)	\$80,700 *	12
Other Injury (B, C)	\$19,314 *	3
No Injury/Property Damage Only (PDO)	\$6,513 *	1

*Source: National Safety Council

Figure 30 - Accident Costs

Intersections: Top 20 Equivalent Property Damage Only (EPDO) 2010-2014								
Intersection	Jurisdiction	City/Township	County	Total Crashes	Number Injured	Serious Injuries	Fatalities	EPDO
Intertown Rd & US 131	MDOT	Bear Creek Twp	Emmet	19	8	2	1	284
N Mackinaw Hwy & Paradise Trl	ECRC	Carp Lake Twp	Emmet	1	1	1	1	243
Howard Rd & Intertown Rd	ECRC	Bear Creek Twp	Emmet	7	2	0	1	240
Charlevoix Ave & Parkview Dr	MDOT	Petoskey	Emmet	10	0	0	1	239
N Conway Rd & E Hathaway Rd & Powers Rd	ECRC	Little Traverse Twp	Emmet	4	2	0	1	237
Bay Harbor Dr & Cliffs Dr	ECRC	Petoskey	Emmet	2	0	0	1	231
Pleasantview Rd & W Van Rd & E Van Rd	Petoskey	Center Twp	Emmet	2	0	0	1	231
Murray Rd & Upper Bay Shore Rd	CCRC	Hayes Twp	Charlevoix	2	0	0	1	231
US 31 & Wheeling Rd	MDOT	Carp Lake Twp	Emmet	1	0	0	1	230
US 131 & Lears Rd	MDOT*	Bear Creek Twp	Emmet	52	15	2	0	100
W Mitchell St & Spring St & Charlevoix Ave	MDOT*	Petoskey	Emmet	67	12	1	0	100
Spring St & US 131 & Anderson Rd	MDOT*	Petoskey	Emmet	60	10	1	0	89
W Mitchell St & Ingalls Ave	MDOT**	Petoskey	Emmet	31	7	3	0	73
N Division Rd & S Division Rd & Mitchell Rd	ECRC*	Bear Creek Twp	Emmet	41	8	1	0	66
Anderson Rd & Lears Rd	ECRC/LTBB*	Bear Creek Twp	Emmet	27	6	1	0	48
M 119 & W Conway Rd	MDOT*	Little Traverse Twp	Emmet	25	7	1	0	48
Charlevoix Ave & Resort Pike Rd	MDOT	Petoskey	Emmet	21	4	2	0	48
N Division Rd & Country Club Rd	ECRC	Bear Creek Twp	Emmet	17	5	2	0	46
Petoskey Ave & Mercer Blvd	MDOT	Charlevoix	Charlevoix	22	7	1	0	45
Intertown Rd & Cemetery Rd	ECRC	Bear Creek Twp	Emmet	8	4	3	0	44
* Signalized Intersection	** Signal installed in 2013							

Figure 31 - Intersections: Top 20 Equivalent Property Damage Only (EPDO) 2010-2014

The accident costs for each type of injury severity were then used to create the EPDO ranking for all of the intersections in the study area as shown in the previous table. This ranking could be used as one way to fairly prioritize intersection improvements.

Another way to prioritize intersection safety is to include the amount of traffic experienced at an intersection as one of the inputs to create a ranking of EPDO per Million Entering Vehicles (MEV). If future performance were to mimic past results, this ranking would reflect a higher likelihood of EPDO to be experienced by a particular vehicle entering a particular intersection. These could be considered a ranking of the most dangerous intersections in the study area, based on likelihood to experience a crash if traffic was equal at all of the intersections.

Intersections: Top 20 Equivalent Property Damage Only (EPDO) per Million Entering Vehicles (MEV) 2010-2014									
Intersection	Jurisdiction	City/Township	County	Total Crashes	Number Injured	Serious Injuries	Fatalities	EPDO	EPDO/MEV
N Mackinaw Hwy & Paradise Trl	ECRC	Carp Lake Twp	Emmet	2	1	1	1	244	316
Murray Rd & Upper Bay Shore Rd	CCRC	Hayes Twp	Charlevoix	2	0	0	1	231	197
Pleasantview Rd & W Van Rd & E Van Rd	ECRC	Center Twp	Emmet	2	0	0	1	231	96
Christie Dr & Hedrick Rd	ECRC	Pleasant View Twp	Emmet	1	1	1	0	12	85
Howard Rd & Intertown Rd	ECRC	Bear Creek Twp	Emmet	7	2	0	1	240	79
Bay Harbor Dr & Cliffs Dr	Petoskey	Petoskey	Emmet	2	0	0	1	231	60
US 31 & Wheeling Rd	MDOT	Carp Lake Twp	Emmet	1	0	0	1	230	39
N Chippewa Dr & Chippewa Dr & Cole Rd	ECRC	Cross Village Twp	Emmet	1	1	1	0	12	28
N Conway Rd & E Hathaway Rd & Powers Rd	ECRC	Little Traverse Twp	Emmet	4	2	0	1	237	25
Fairbairn Ln & River St	Alanson	Alanson	Emmet	2	1	1	0	13	21
Roth Rd & Canby Rd	ECRC	Center Twp	Emmet	1	1	0	0	3	17
Smith Rd & Lakeview Rd	ECRC	Littlefield Twp	Emmet	1	1	1	0	12	17
Nichols Rd & E Van Rd	ECRC	Center Twp	Emmet	1	1	1	0	12	15
Intertown Rd & US 131	MDOT	Bear Creek Twp	Emmet	19	8	2	1	284	14
Park St & State St	Pellston	Pellston	Emmet	1	1	0	0	3	13
Greenwood Rd & Cedar Valley Rd	ECRC	Bear Creek Twp	Emmet	1	3	3	0	37	12
Intertown Rd & Cemetery Rd	ECRC	Bear Creek Twp	Emmet	8	4	3	0	44	12
E Sturgeon Bay Trl & W Sturgeon Bay Trl & Canby Rd	ECRC	Bliss Twp	Emmet	2	1	0	0	4	10
Valley Rd & Garber Rd	ECRC	Bliss Twp	Emmet	1	1	0	0	3	10
Charlevoix Ave & Parkview Dr	MDOT	Petoskey	Emmet	10	0	0	1	239	10

Figure 32 - Intersections: Top 20 Equivalent Property Damage Only 2010-2014

The ranking based on EPDO per MEV contains some intersections that had very little accident history. In order to weed out the intersections with a small sample size, a similar ranking was created but with a minimum EPDO of 20.

Intersections: Top 20 EPDO per Million Entering Vehicles (MEV) 2010-2014 (Minimum 20 EPDO)									
Intersection	Jurisdiction	City/Township	County	Total Crashes	Number Injured	Serious Injuries	Fatalities	EPDO	EPDO/MEV
N Mackinaw Hwy & Paradise Trl	ECRC	Carp Lake Twp	Emmet	2	1	1	1	244	316
Murray Rd & Upper Bay Shore Rd	CCRC	Hayes Twp	Charlevoix	2	0	0	1	231	197
Pleasantview Rd & W Van Rd & E Van Rd	ECRC	Center Twp	Emmet	2	0	0	1	231	96
Howard Rd & Intertown Rd	ECRC	Bear Creek Twp	Emmet	7	2	0	1	240	79
Bay Harbor Dr & Cliffs Dr	Petoskey	Petoskey	Emmet	2	0	0	1	231	60
US 31 & Wheeling Rd	MDOT	Carp Lake Twp	Emmet	1	0	0	1	230	39
N Conway Rd & E Hathaway Rd & Powers Rd	ECRC	Little Traverse Twp	Emmet	4	2	0	1	237	25
Intertown Rd & US 131	MDOT	Bear Creek Twp	Emmet	19	8	2	1	284	14
Greenwood Rd & Cedar Valley Rd	ECRC	Bear Creek Twp	Emmet	1	3	3	0	37	12
Intertown Rd & Cemetery Rd	ECRC	Bear Creek Twp	Emmet	8	4	3	0	44	12
Charlevoix Ave & Parkview Dr	MDOT	Petoskey	Emmet	10	0	0	1	239	10
Pickere! Lake Rd & Silver Creek Rd	ECRC	Springvale Twp	Emmet	9	2	1	0	22	6
State St & Howard St	Petoskey	Petoskey	Emmet	7	2	1	0	20	5
Resort Pike Rd & Intertown Rd	ECRC	Resort Twp	Emmet	11	4	1	0	28	5
US 131 & Lears Rd	MDOT*	Bear Creek Twp	Emmet	52	15	2	0	100	4
N Division Rd & Country Club Rd	ECRC	Bear Creek Twp	Emmet	17	5	2	0	46	4
Bay Rd & US 31 & Townline Rd & Charlevoix Ave	MDOT	Hayes Twp	Charlevoix	8	4	1	0	25	4
Deer View Ln & S Division Rd & Cedar Ridge Dr	ECRC	Bear Creek Twp	Emmet	1	2	2	0	25	3
Spring St & US 131 & Anderson Rd	MDOT*	Petoskey	Emmet	60	10	1	0	89	3
M 119 & W Conway Rd	MDOT*	Little Traverse Twp	Emmet	25	7	1	0	48	3

* Signalized Intersection

Figure 33 - Intersections: top 20 EPDO per Million Entering Vehicles 2010-2014

Intersection Ranking Summary

The final intersection ranking that was produced above would be an appropriate list to use to prioritize intersection improvements on and near the LTBB reservation and tribal population centers.

Intersection Safety Improvement Implementation

The implementation of the intersection safety improvement should be spearheaded by the LTBB. Efforts should be undertaken to visit each of the ranked intersections and determine the appropriate strategies to improve safety at each intersection. As necessary, CCRC, ECRC, MDOT, the City of Charlevoix, the City of Petoskey, or a combination these entities' efforts will be required in order to implement the improvements.

Local road intersections with a significant number of correctable crashes and therefore high benefit/cost ratio should first be identified and, if any candidates are found, submitted to the MDOT Local Agency Safety Program for funding.

Intersections on state trunklines should be identified to the appropriate staff at the MDOT Gaylord Transportation Service Center. The LTBB Tribal Council should adopt a resolution identifying the problem intersections and urging MDOT to add projects to either their safety program, trunkline rehabilitation and reconstruction program, or traffic signal modernization program.

The LTBB should submit for Tribal Transportation Program Safety Funds (TTPSF) to secure funding for safety improvements at the remainder of the intersections. Obtaining additional funding will be the best way to quickly address safety at multiple intersections.

If the LTBB is not successful in obtaining additional TTPSF funds, the tribe should consider setting aside a portion (10% annually for example) of their annual TTP funds to create a LTBB Safety Program. Each year, the LTBB Safety Program could tackle a few intersections and make fairly rapid progress on the intersection list.

Traffic Study at Intersection of McDougal and Atkins Roads

As part of the project to construct a new stadium at the Petoskey High School campus outlined in section 7.1.3, is a new access to the campus from the south via the extension of McDougal Road into the campus north of Atkins Road. The existing three-legged intersection of Atkins and McDougal will become a four-legged intersection with an expected order of magnitude increase in traffic. Since this intersection did not exist in its new configuration at the time of this study, it wasn't included in the analysis. With the increase in traffic and additional leg added to this intersection, the potential for crashes is high. A traffic study should be commissioned ideally before the intersection becomes operational in its new configuration and any recommendations should be implemented during construction. One possibility might be the installation of a traffic signal at this intersection.

Emphasis Area #2: Lane Departure and Curves

Lane departure is identified as an emphasis area for the State of Michigan in their SHSP. For the purposes of this TTSP, the study area for lane departure and curves is the same as for intersections. The study area encompasses all of Emmet County plus the portion of the LTBB reservation that lies in Charlevoix County. In Michigan during 2011, lane departure crashes accounted for 18.5 percent of crashes and 48.6 percent of fatal crashes¹². Within the study area between 2010 and 2014, five people were killed and 29 were seriously injured in 29 crashes involving a curve. The average crash rate for horizontal curves is about three times that of other types of highway segments. About three-quarters of curve-related fatal crashes involve a single vehicle leaving the roadway and striking trees, utility poles, rocks or other fixed objects, or overturning.¹³

Curves, lane departure, and serious traffic crashes go hand in hand. For example, between 2010 and 2014 there were 59 serious lane departure crashes that resulted in 11 fatalities and 65 serious injuries within the study area. Of those 59 crashes, 29 of them also were on a curve. The data suggests that if we could address lane departure just on curves, we could reduce lane departure serious crashes by over half.

Lane Departure and Curves: Objective

The main objective is to create a list of priority curves within the LTBB study area and address lane departure safety of 50% of those curves within the next five years.

In general, to reduce the number and severity of roadway departure crashes, safety practitioners focus on a hierarchy of three objectives¹⁴:

- 1.) Keep vehicles on the roadway.
- 2.) If a vehicle leaves the roadway, provide an opportunity to return to the road safely; and
- 3.) Minimize the severity of a roadway departure crash if it occurs.

¹² Governor's Traffic Safety Advisory Committee, "State of Michigan Strategic Highway Safety Plan 2013-2016"

¹³ University of California – Berkeley, Safe Transportation Research and Education Center, "SafeTrec – Rural Road Safety" web page, 2009. Available at <http://www.tsc.berkeley.edu/research/ruralroads.html>

¹⁴ USDOT, FHWA, "Roadway Departure Safety: A Manual for Local Road Owners", 2015. Available at http://safety.fhwa.dot.gov/local_rural/training/fhwasa1109/fhwasa1109.pdf

Strategies for Addressing Lane Departure and Curves

The strategies below range from very low cost and fast implementation time to more costly and more planning required. The low-cost strategies should be considered first.

- Install advanced curve warning signs
- Provide curve delineation signing (Chevrons)
- Install object markers
- Install centerline and edge line pavement markings
- Install edge line, shoulder, or centerline rumble strips
- Install pavement friction treatments
- Provide safety edge for pavement edge drop-off
- Removing, moving, or marking fixed objects
- Create clear zones

List of Curves with Fatal or Serious Injury Crashes

Curves: Serious Injuries or Fatalities, 2010-2014						
Road Name	From:	To:	County	Jurisdiction	Fatalities	A-Injuries
Canby Rd.	Creekside Dr.	Garber Rd.	Emmet	ECRC	0	1
Chippewa Dr.	Cole Rd.	Park Ln.	Emmet	ECRC	0	1
Cliffs Dr.	Bay Harbor Dr.		Emmet	Petoskey	1	0
Evergreen Tr.	Mindel Rd.	King Rd.	Emmet	ECRC	0	2
Hedrick Rd.	W. Brutus Rd.	Herring Bone Dr.	Emmet	ECRC	0	1
Highlands Pike	Hedrick Rd.	Boyne Highlands Rd.	Emmet	ECRC	0	1
Johnston Hill Rd.	N. State Rd.	W. Van Rd.	Emmet	ECRC	1	0
S. Lakeshore Dr.	Ridge Rd.	Lower Shore Dr. (North)	Emmet	MDOT	0	2
Lake Shore Dr.	S. Lamkin Rd.	Middle Village Rd.	Emmet	MDOT	0	1
Levering Rd.	Lookout Rd.	Zmikly Rd.	Emmet	ECRC	0	1
M-119	Wormwood Ln.	Island View Rd.	Emmet	MDOT	0	1
Mackinaw Hwy	Cypress St.	Dow Rd.	Emmet	ECRC	1	1
Miller Rd	M-68		Emmet	ECRC	0	1
Mitchell Rd.	Skyline Rd.	Berger Rd.	Emmet	ECRC	0	1
Mitchell Rd.	Roy Rd.	S. Ellsworth Rd.	Emmet	ECRC	0	1
Pleasantview Rd.	Schmalzried Rd.	E. Sturgeon Bay Trl.	Emmet	ECRC	1	0
Powers Rd.	Luce St.	Moore Rd.	Emmet	ECRC	0	1
Robinson Rd.	N. Frank Rd.	N. State Rd.	Emmet	ECRC	1	0
State Rd.	Johnston Hill Rd.	Trick Rd.	Emmet	ECRC	0	1
US-31	E. Van Rd.	Ball Rd.	Emmet	MDOT	0	1
Valley Dr.	Jane St.	Wenniway Rd.	Emmet	Mackinaw City	0	1
Wormwood Rd.	Vorce Rd.		Emmet	ECRC	0	1
Petoskey Ave.	Burns St.	Meech St.	Charlevoix	MDOT	0	1
Michigan Ave.	Dixon Ave.	Petoskey Ave.	Charlevoix	MDOT	0	1
Boyne City Rd.	Maple Grove Rd.	Brown Rd.	Charlevoix	CCRC	0	1
Old 31	Smith Rd.	Struthers Rd.	Charlevoix	CCRC	0	1
US-31	Lakeview Dr.	Nine Mile Point Dr.	Charlevoix	CCRC	0	3
US-31	Bay Shore Villa Dr.	Lakeview Dr.	Charlevoix	CCRC	0	1
Old 31	Shrigley Rd.	Smith Rd.	Charlevoix	CCRC	0	1
				Totals	5	29

Figure 34 - Curves: Serious Injuries or Fatalities 2010-2014

Curve Safety Improvement Implementation

The implementation of the curve safety improvement should be spearheaded by the LTBB. Efforts should be undertaken to visit each of the curve locations and determine the appropriate strategies to improve safety at each one. As necessary, CCRC, ECRC, MDOT, the Village of Mackinaw City, the City of Petoskey, or a combination these entities' efforts will be required in order to implement the improvements.

The possibility of obtaining MDOT local road safety funding should be investigated for Old 31 in Charlevoix County. Two serious-injury crashes have occurred in a relatively short period of time and might qualify for the program. If further investigation warrants, a potential project could be submitted to the MDOT Local Agency Safety Program for funding.

The LTBB should submit for Tribal Transportation Program Safety Funds to secure funding for low-cost safety improvements at a number of curves. A systemic approach should be considered to improve safety in a similar manner for all of the curves on the list as a start.

If the LTBB is not successful in obtaining additional TTPSF funds, the tribe should consider setting aside a portion (10% annually for example) of their annual TTP funds to create a LTBB Safety Program. Each year, the LTBB Safety Program could tackle a few curves and make fairly rapid progress on crossing curves off the list.

Emphasis Area #3: Pedestrians and Bicyclists

The study area for pedestrian and bicycle safety encompasses all of Emmet County plus the portion of the LTBB reservation that lies in Charlevoix County. Two people were killed and five were seriously injured between 2010 and 2014, at least one of which was a tribal member.

Pedestrians and Bicycles: Objective

The objective is to reduce the number of pedestrians and bicyclists, especially tribal members, which are involved in transportation accidents on the LTBB Reservation.

Strategies for Addressing Pedestrians and Bicycle Safety

Strategies for improving pedestrian and bicycle safety could include:

- Adopting a LTBB complete streets resolution
- Raising awareness of pedestrian and bicycle safety
- Purchasing high visibility coats and helmets and offering to interested tribal members
- Including pedestrian and bicycle safety in any future LTBB safety program
- Commit to at least one pedestrian and bicycle safety project per year

Complete streets is an idea that focuses on creating culture change, process change, and re-prioritization inside the established profession of transportation planning and engineering to ensure roads are designed, operated, and maintained for all users. Sample language for such a resolution is available online on the Smart Growth America website¹⁵. A complete streets resolution could outline the LTBB's intent with regard to road design and construction on the reservation, especially for projects funded with Tribal Transportation Program funds.

List of Bicycle and Pedestrian Serious Injury Crashes

Bicyclists and Pedestrians: Serious Injuries or Fatalities, 2010-2014						
Road Name	From:	To:	County	Jurisdiction	Fatalities	A-Injuries
Charlevoix Ave.	at Greenwood Rd.		Emmet	MDOT	0	1
Luce St.	US-31	Indiana St.	Emmet	ECRC/MDNR	1	0
W. Conway Rd.	Heydey St.	Commerce Ct.	Emmet	ECRC	0	1
Anderson Rd.	Kolinski Rd.	Fletcher Rd.	Emmet	ECRC	1	0
US-31	at Reed Ave.		Emmet	MDOT	0	1
River St.	US-31	Fairbairn Ln.	Emmet	Alanson	0	1
Howard St.	at State St.		Emmet	Petoskey	0	1
				Totals	2	5

Figure 35 - Bicyclists and Pedestrians: Serious Injuries or Fatalities 2010-2014

¹⁵ Smart Growth America website: <http://www.smartgrowthamerica.org/complete-streets/changing-policy/model-policy>

EVALUATION & IMPLEMENTATION

The Little Traverse Bay Band of Odawa Indians will maintain the LTBB Mobility Coordinator as the point of contact for progress on the plan goals. This Tribal Transportation Safety Plan will be considered for revision every five years. The LTBB will remain an active participant in promoting transportation on the LTBB reservation by continuing to work with the Emmet and Charlevoix County Road Commissions to reconstruct and improve safety on failing roads on the reservation. The LTBB also plans to utilize this plan to apply for additional Tribal Transportation Safety Funds to address the emphasis areas outlined in the plan in addition to other potential safety improvements. Lastly, the LTBB plans to continue to participate with other transportation safety partners whenever possible to promote transportation safety on the reservation.