Moving Towards Zero Deaths on Region 2 Local Roads

2017 Regional Transportation Safety Plan

Region 2 Planning Commission

MDOT Michigan Department of Transportation

Month 2017

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Regional Transportation Safety Plan

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The Regional Transportation Safety Plan for

Hillsdale, Jackson, and Lenawee Counties

has been accepted by the Steering Committee on Month, Day, 2017.

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Acknowledgements

The 2017 Regional Transportation Safety Plan developed for Hillsdale, Jackson, and Lenawee Counties in Region 2 was developed with local backing and guidance and supported by the Michigan Department of Transportation and Opus International Consultants Inc. Special thanks goes to the local stakeholders and steering committee members for providing insight and guidance into the concerns and needs of the local communities to be served by this document.

Executive Summary

The overarching goal of the Regional Transportation Safety Plan (RTSP) is the reduction of fatal and serious injury crashes within Hillsdale, Jackson, and Lenawee Counties which form the region boundaries. The process is directed by the FHWA guiding document, "Developing Safety Plans: A Manual for Local Rural Road Owners". This process involves six steps including:

1. Establishing Strong Leadership & Advocates
2. Analyzing Safety Data
3. Determining Emphasis Areas
4. Identifying Strategies & Countermeasures
5. Prioritizing and Incorporating Strategies
6. Evaluating and Updating the RTSP

This report includes the initial five steps of the process while the final step is conducted on a regular basis to help ensure that the RTSP remains current and relevant to the local communities it is designed to serve. Additionally, while typical reports include countermeasures designed around engineering related treatments, the RTSP employs the four E's when addressing the identified Emphasis Areas, including:

- Engineering,
- Education,
- Enforcement, and;
- Emergency Services.

As mentioned, during this process a high-level analysis of historic crash data available in the area was completed to help assess existing conditions and identify potential Emphasis Areas to guide specific crash reduction efforts. Additional consultation meetings were conducted with a wide range of stakeholders including representatives from the four E's as well as each of the three counties. Based on the combined review of the crash analysis and stakeholder guidance and feedback, six Emphasis Areas were identified for the region and listed in alphabetical order.

- At-risk driver age groups
- Driver Behavior
- Impaired Drivers
- Intersection Related
- Non-Motorized
- Single Vehicle Crashes

The selected Emphasis Areas and guidance from region stakeholders were used to categorize practical treatment strategies for addressing the identified target crashes. Detailed treatment information and details from the crash analysis and stakeholder consultation is available in the report and accompanying appendices.

Glossary of Terms

4 E's	Engineering, Enforcement, Education and Emergency Services
ADA	Americans with Disabilities Act
ARIDE	Advance Roadside Field Sobriety Test Program
CMAQ	Congestion Mitigation and Air Quality Improvement (CMAQ) Program
Crash Severity	Fatal injury (K), incapacitating injury (A), non-incapacitating injury (B), possible injury (C) or property damage only (O)
DRE	Drug Recognition Expert Program
FHWA	Federal Highway Administration
MDOT	Michigan Department of Transportation
MPO	Metropolitan Planning Organization
MVMT	Million Vehicle Miles Traveled
RTSP	Regional Transportation Safety Plan
SFST	Standard Field Sobriety Testing Program
SR2S	Safe Routes to School Program
STP	Surface Transportation Improvement Grants
TAP	Transportation Alternatives Program
Trunkline	The State Trunkline Highway System consists of all state highways in Michigan, including those designated as Interstate (I-), United States Numbered (US-), or State Trunkline (M-) highways.

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1 Introduction

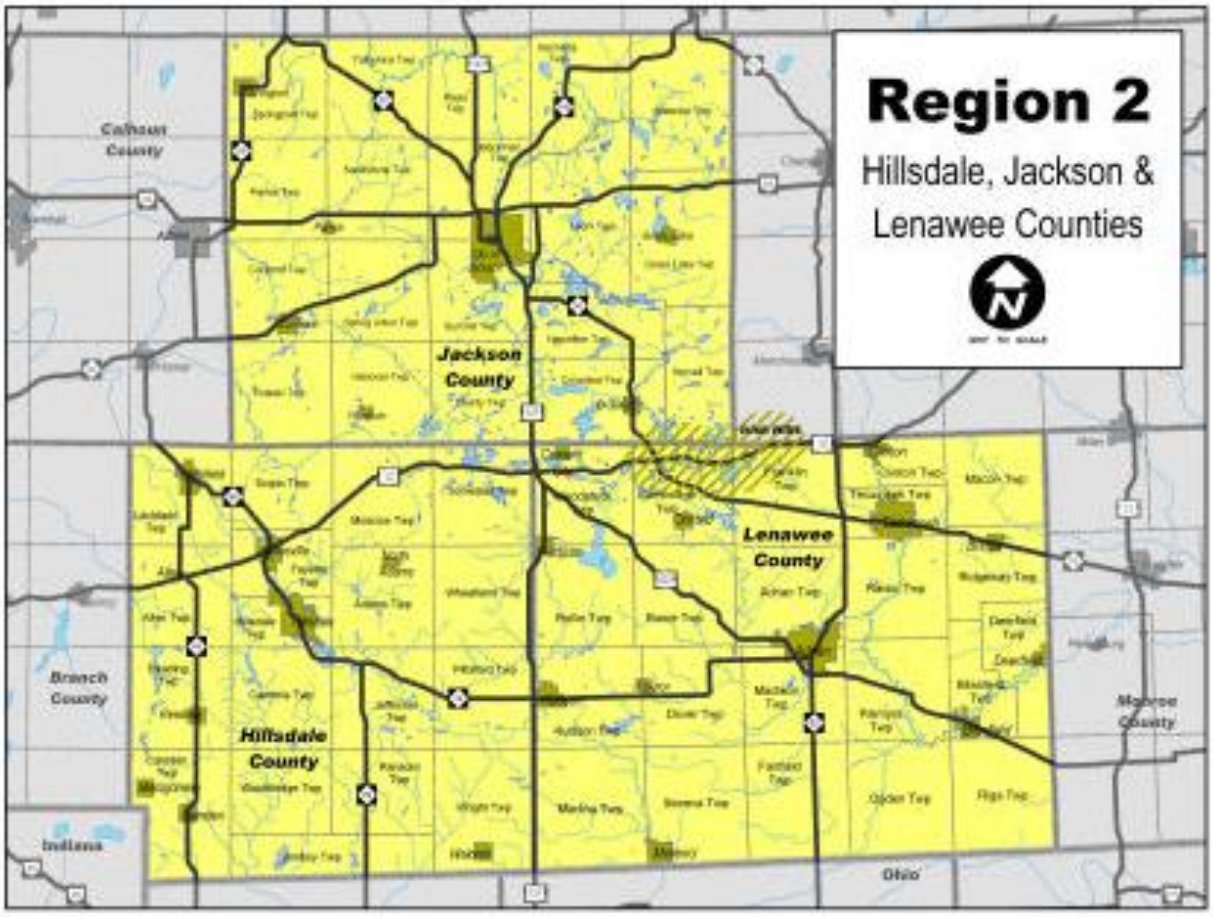
The Michigan Department of Transportation (MDOT) has been working towards zero deaths on Michigan roadways. While substantial progress has been made at the state and local levels, additional assistance and direction is required. This is due, in part, to the fact that while only 19 percent of the United States population lives in rural areas, roughly 53 percent of all traffic fatalities occur there[1]. In addition, the rural fatality rate is roughly 2.6 times higher than the urban fatality rate[2]. A significant portion of these crashes, roughly one quarter, occur on non-federal aid highways[3]. As a part of this drive for progress, the Department has been working with regional planning councils and commissions to help facilitate the development of Regional Transportation Safety Plans (RTSP). The intent of these RTSP is to collect and analyze crash data and other safety information for a more locally focused analysis and combine that with the knowledge and concerns of the local agencies and citizens.

1.1 Background

MDOT has taken steps to support the development of RTSPs for the 14 State Planning and Development Regions in Michigan. These regions are based on the counties contained in each of the local planning commissions or councils with the intent of utilizing local knowledge and existing or potential inter-agency relationships to assist in the development process, as well as future evaluation and review cycles. The focus area for this RTSP is the area encompassed by the Region 2 Planning Commission, consisting of Hillsdale, Jackson, and Lenawee counties. Figure 1 provides the geographic extent to be covered under this plan.

The goal of this document is to help provide local agencies with guidance regarding local areas of concern identified during the development process and through consultation. From these areas, a series of treatment strategies are presented which come from any of the four E's; Engineering, Education, Enforcement, and Emergency Services. Upon completion of the final report, local agencies will be responsible for the evaluation and maintenance of the plan, to ensure that it reflects the changing needs and characteristics of the region.

[1] National Highway Traffic Safety Administration, National Center for Statistics and Analysis, Traffic Safety Facts, Rural/Urban Comparison, 2013 Data (PDF), DOT HS 812 181
[2] FHWA Highway Statistics (2013) - http://www.fhwa.dot.gov/policyinformation/statistics/2013/
[3] Ibid.



Source: http://www.region2planning.com/

Figure 1 – Region 2 Planning Commission Location

1.2 Mission, Vision & Goals

The following sections provide the mission, vision, and goals for the RTSP based on general guidelines, crash data, and feedback received by stakeholders and the steering committee. The vision is a simple description of the desired outcome of the RTSP. The vision of the Region 2 Planning Commission area RTSP is as follows:

Vision

Move Toward Zero Deaths

The mission statement supports the overall vision and should provide direction. The mission of the Region 2 Planning Commission area RTSP is guided in part by the Strategic Highway Safety Plan and is as follows:

Mission

Improve traffic safety on local roads by fostering improved safety, communication, coordination, collaboration, and education within the three counties.

The goals of the RTSP take the mission and vision a step further and ties them to specific targets for the plan in terms of real values and measurable targets. The following three goals are based on the crash history experienced in the region and concerns raised by local stakeholders.

Goals

Identify three safety partners to increase awareness.

Reduce traffic fatality crash rates per 100MVMT from .0035 in 2015 to .0026 in 2025.

Reduce serious traffic injury crash rates per 100MVMT from .0148 in 2015 to .0081 in 2025.

The goals are graphically represented in Figures 2 and 3. These figures include the targets measured in crashes per one hundred million vehicle miles traveled (crashes per 100MVMT) as well as the raw yearly crash total for each category. Each measurement is important to consider in tandem. The crash rate includes the effects of exposure as crashes tend to increase with increases in traffic volumes. This aspect is omitted when viewing only the raw crash counts. The raw counts, however, are more easily grasped and can be used to counter potentially misleading crash rate reductions which could be due to lower traffic volumes instead of raw crashes.

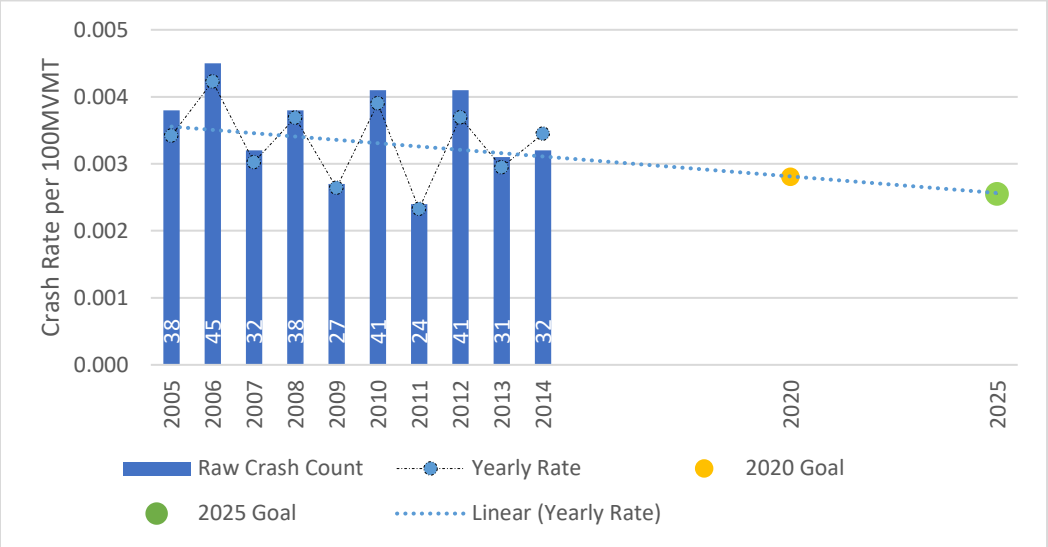


Figure 2 – Total Fatal Injury Crash Goal

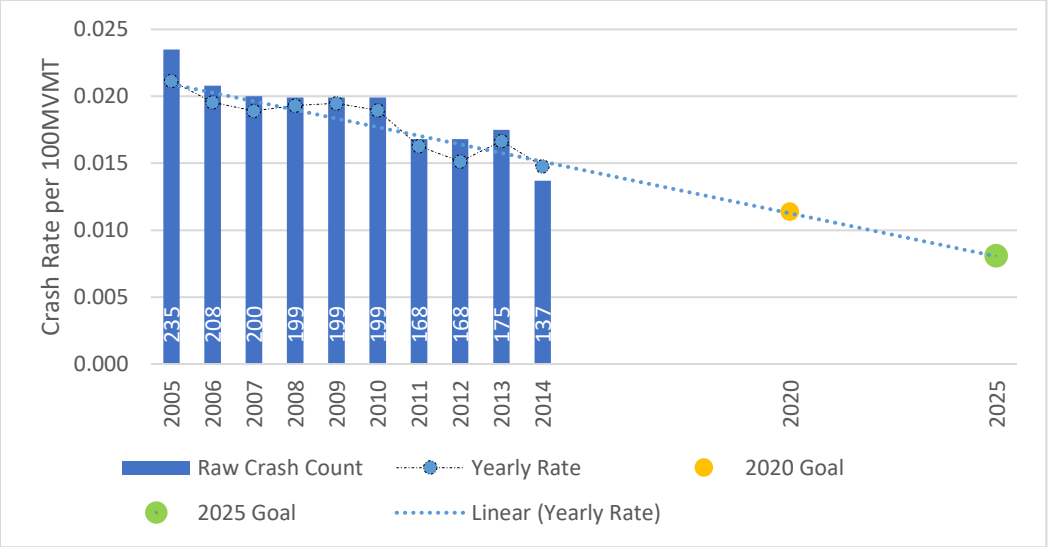


Figure 3 – Total Serious Injury Crash Goal

1.3 Introduction to the Four "E's" of Safety

While a significant portion of transportation safety studies tend to focus on the potential to employ engineering safety treatments, potential countermeasures considered for the RTSP also include strategies related to enforcement, education and emergency services. This is designed to better leverage the various components, related agencies and opportunities to reduce the prevalence of traffic crashes in addition to engineering improvements. Figure 4 provides a summary of each of the 4 E's and examples of treatments related to each.

Engineering	•Countermeasures requiring various levels of construction projects to address safety concerns. •Examples include widening paved shoulders, converting a stop controlled intersection to a traffic signal, etc.
Enforcement	•Countermeasures involving law enforcement and patrolling. •Examples include the use of seat belt check points, heightened speed enforcement, etc.
Education	•Countermeasures related to increasing public education and awareness of traffic safety and operations. •Examples include Public Service Announcements, educational programs through schools, etc.
Emergency Services	•Countermeasures involving emergency response services. •Examples include measures taken to reduce response times, ensuring responders have a safe and efficient means of travel, and improving responder and motorist safety with traffic incident management training for responders.

Figure 4 – Four "E's" of a Regional Transportation Safety Plan

2 Regional Transportation Safety Plan Methodology

2.1 Safety Data Analysis

Crash data for the region was obtained from the Michigan Department of Transportation (MDOT). An initial crash analysis consisted of a review of historic crash data from 2005 through 2014 to review the trends over this time period. More in-depth analysis has been conducted on the data collected from 2010-2014 with an addendum added for available 2015 data. The results of this analysis, when paired with feedback received from the Steering Committee and other stakeholders, was used to identify and prioritize treatment strategies for the region. The following sections provide a summary of the most relevant crash analysis results with additional details available in Appendix B and Appendix C.

2.1.1 Historic Crash Data

The annual crash frequencies show a downward trend for fatal and serious injury type crashes, as shown in Figure 5. The rolling five-year average is also shown in the figure to help reduce the variation normally seen from year to year. To account for the change in traffic volumes over this ten-year period, a crash rate was calculated per 100 million vehicle miles of travel (MVMT), as shown in Figure 6. When compared to the statewide fatal and serious injury crash rate, the region along with the individual Counties experience more fatal and serious injury crashes per 100 MVMT. The crash rate for the region along with the County crash rates are trending higher than the statewide values.

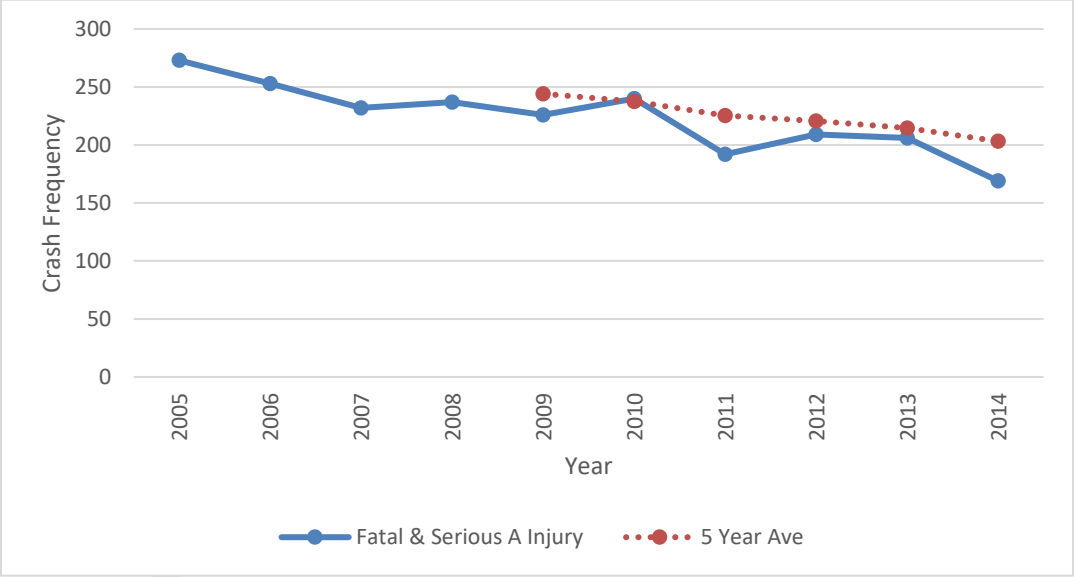


Figure 5 – Region's Historic Fatal & Serious Injury Crash Frequencies

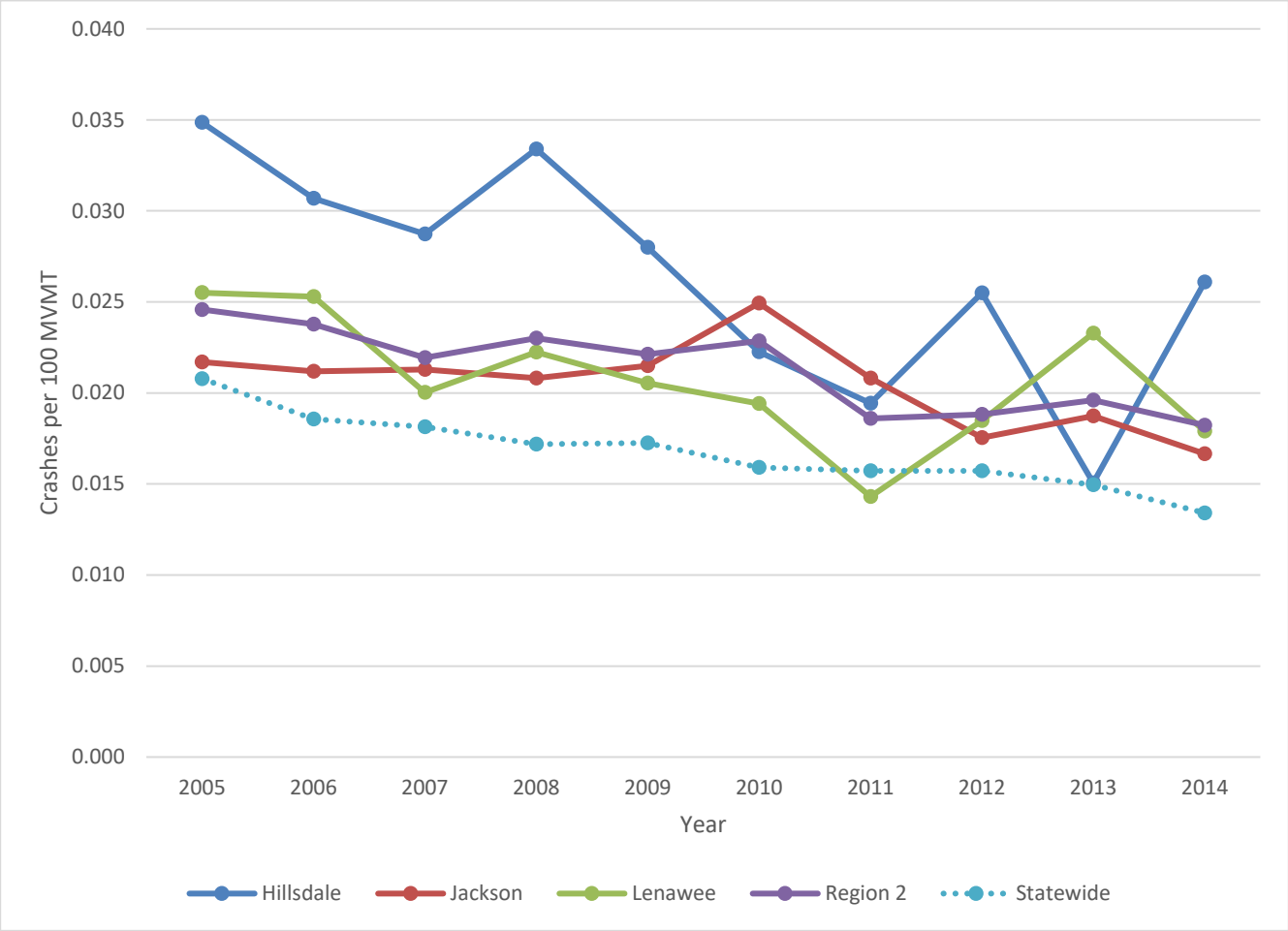


Figure 6 – Fatal & Serious Injury Crash Rate (Crashes per 100 MVMT)

2.1.2 Region Crash Analysis (2010-2014)

A crash analysis was conducted for the entire three county region to develop a profile of various significant crash statistics. The results of this analysis as well as feedback received from the stakeholders were used to help identify the Emphasis Areas for the region. Table 1 summarizes crash frequencies for the five-year study period for each County and the region as a whole. Table 2 summarizes the crash types for all crashes and for fatal & incapacitating injury type crashes. It should be noted that deer involved crashes (33% of the total crashes in the region) have been excluded from the analysis. Using this data, Figures 7 through 13 provide a brief summary of some of the more significant findings.

The Statewide statistics include all roads for the entire State of Michigan while the region includes crashes occurring on all roads in all three counties. Crashes occurring on Non-Trunkline roads, i.e. excluding the State maintained trunkline system, were also analyzed to determine whether Non-Trunkline roads experience different crash trends. This comparison between regions and systems provides a high-level understanding of how the network has been performing over the past five years.

Where crash severity is defined,

PDO- Property Damage Only
Injury Severity C- Possible Injury
Injury Severity B- Non-Incapacitating Injury
Injury Severity A- Incapacitating Injury
K&A- Fatal Crashes and Incapacitating Crashes (Injury Severity A)
All- Crashes including Property Damage Only, Injury, and Fatal Crashes

Table 1 – Five Year Crash Frequency Summary

	2010		2011		2012		2013		2014		5-Year Total	
	All	K&A	All	K&A	All	K&A	All	K&A	All	K&A	All	K&A
Hillsdale	735	32	749	25	783	34	731	19	781	29	3,779	139
Jackson	3,676	139	3,726	110	3,470	114	3,518	109	3,889	89	18,279	561
Lenawee	1,765	61	1,708	46	1,726	56	1,737	72	1,823	45	8,759	280
Region 2 Total	**6,176**	**232**	**6,183**	**181**	**5,979**	**204**	**5,986**	**200**	**6,493**	**163**	**30,817**	**980**

Table 2 – Crash Types, Five Year Annual Average

Crash Type	All Crashes, Annual Average	Fatal & Incapacitating Injury, Annual Average
Single Vehicle	2158.8	91.0
Rear End	1432.0	20.2
Angle	938.6	31.2
Other / Unknown	695.8	9.0
Sideswipe Same	496.0	3.0
Sideswipe Opposite	152.8	3.8
Left-Turn Head-on	111.4	5.6
Head-On	89.0	13.2
Pedestrian/Bicyclist	89.0	19.0
Total, Annual Average	6163.4	196.0

The following tables and figures provide comparisons between the counties and the state as well as between trunkline and non-trunkline systems. These comparisons help to provide a high-level understanding of how the network has been performing over the past five years. For clarification, the following definitions hold for the memo with additional clarification provided as needed.

- **Statewide Network** – Includes the full road network within the state, including the Region 2 Planning Commission, as well as local and state maintained roadways and associated crashes.

- **Regional Network** – Includes the full road network within the three-county region including local and state maintained roadways and associated crashes.
- **Trunkline System** – Includes the state maintained roadway network including Interstate, US, and Michigan designated routes (I-, US-, and M-) and associated crashes.
- **Non-Trunkline System** – Includes the non-state maintained roads, i.e. *excluding* Interstate, US, and Michigan designated routes.

As shown in Figure 7, more than half of the crashes reported in Region 2 during the analysis period occurred on non-trunkline roads. Crashes that occurred on non-trunkline roads also resulted in a greater proportion of fatal and incapacitating injury crash severities.

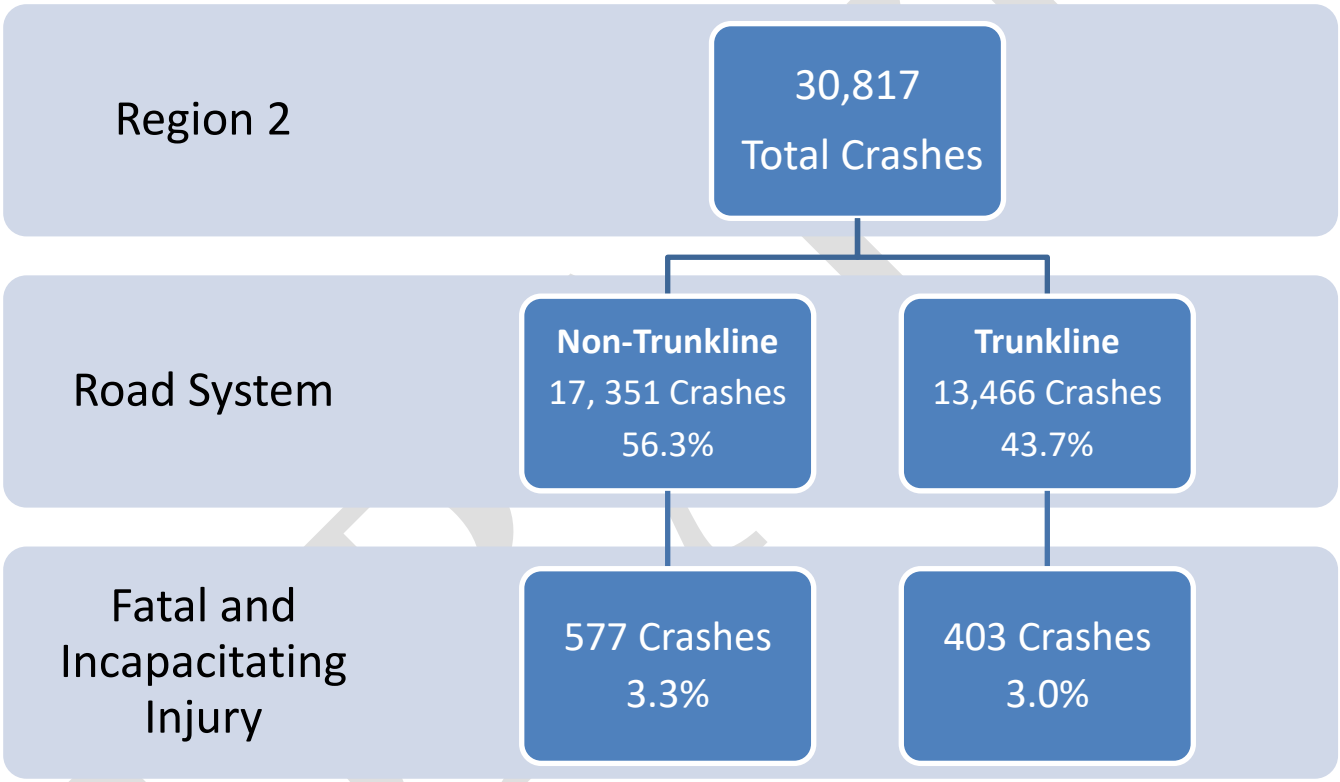


Figure 7 – Comparison of Trunkline vs. Non-Trunkline 5-year Crash Frequency

As shown in Figure 8, approximately 24 percent of the reported crashes in Region 2 during the analysis period resulted in a fatality or injury. It should be noted that the region experienced a slightly greater proportion of fatal and injury crashes than was experienced statewide (23.6% vs 22.1%). During the five-year period, more than three percent of the crashes experienced in the region resulted in a fatality or a serious injury which is one percent more than the State's fatal and serious injury experience.

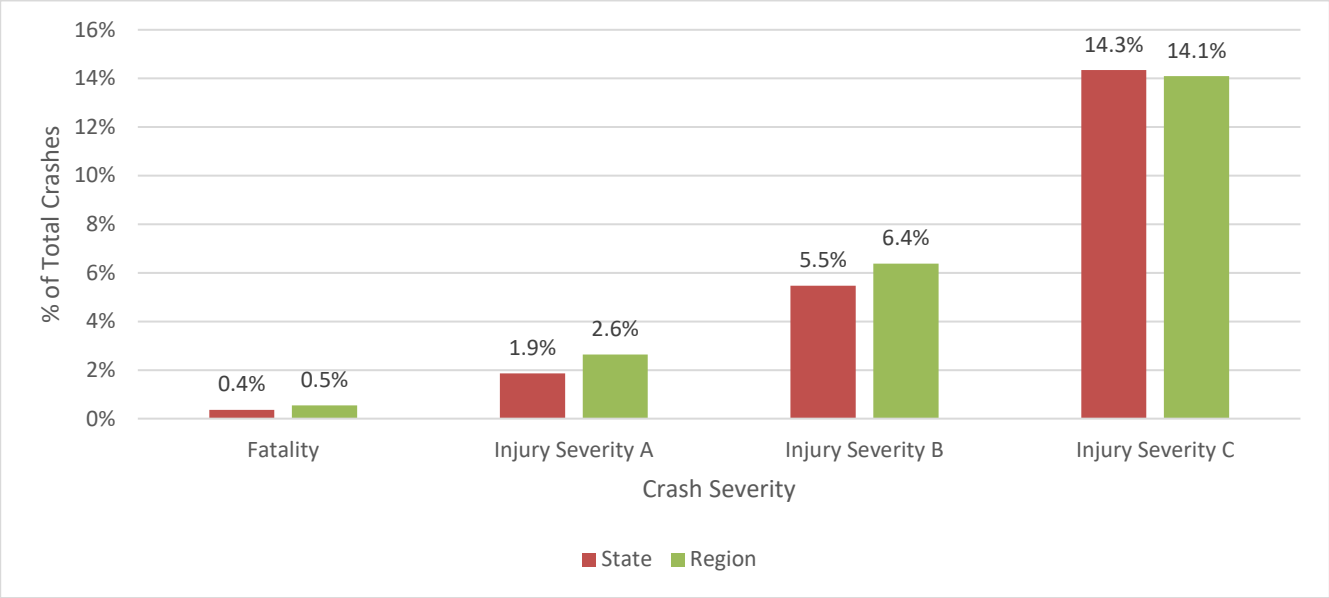


Figure 8 – State and Region 2 Crash Severity Distribution

In addition to a comparison between the state and the region, the distribution of crash severities was considered across the trunkline and non-trunkline portions of the system. Figure 9 provides a summary of this information, with both systems tending to track fairly closely with each other in terms of the distribution of crash severities. However, when considering fatal and incapacitating injury crashes across the entire network, approximately 59% (577 out of 980) of the crashes occurred on the non-trunkline portion of the road network.

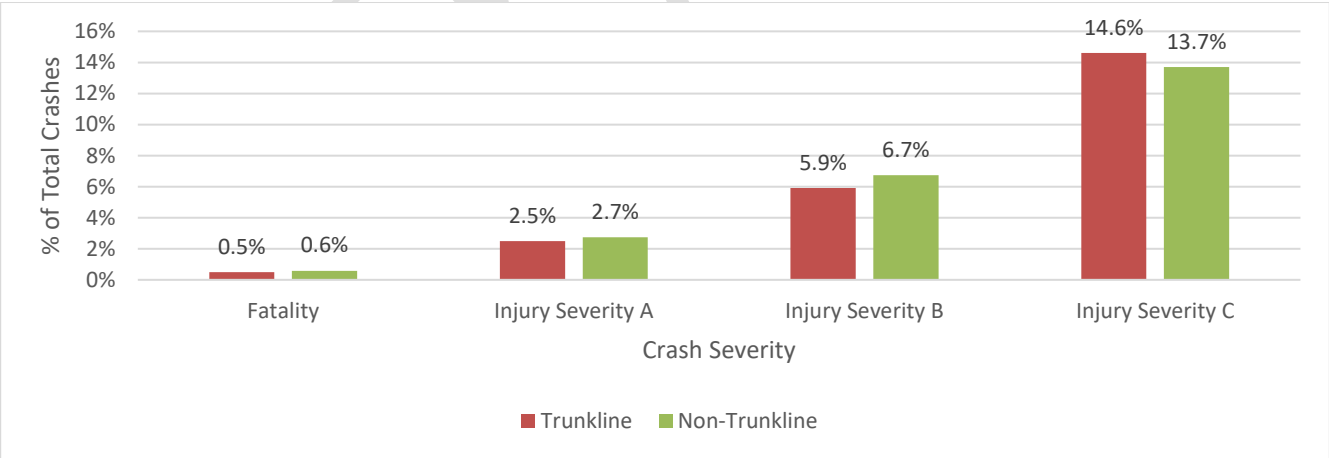


Figure 9 – Region 2, Trunkline and Non-Trunkline Severity Distribution

Figure 10 provides a comparison between the distribution of State, region and local road system crashes with crash types ranked in descending order based on the Non-Trunkline distribution. Single vehicle crashes were the most prevalent crash type in the region followed by rear-end and angle type crashes. This slightly differs from the State's crash distribution which shows rear-end crashes as being the post prevalent. As shown, the distribution of crashes occurring on the local system tend to show increased

proportions of single vehicle, angle, sideswipe opposite, head-on, and other/unknown crashes types than the Region 2 road system as a whole.

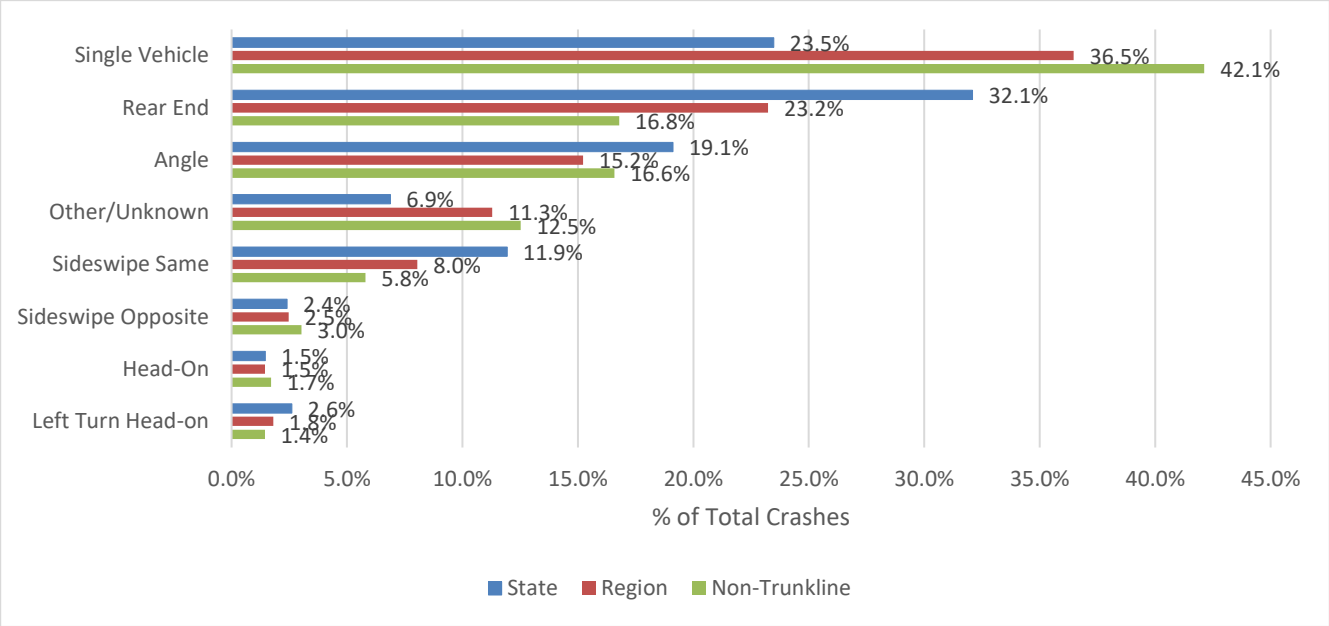


Figure 10 – Region 2 Crash Type Distribution, All Severities

Figure 11 provides a comparison between all severities of non-trunkline crashes in the region vs fatal and serious injury crashes. While the top three crash types are the same when considering all crashes and fatal and serious injury crashes, the order changes. Most significantly, single vehicle type crashes account for over half of all fatal and serious injury crashes followed by angle and rear end.

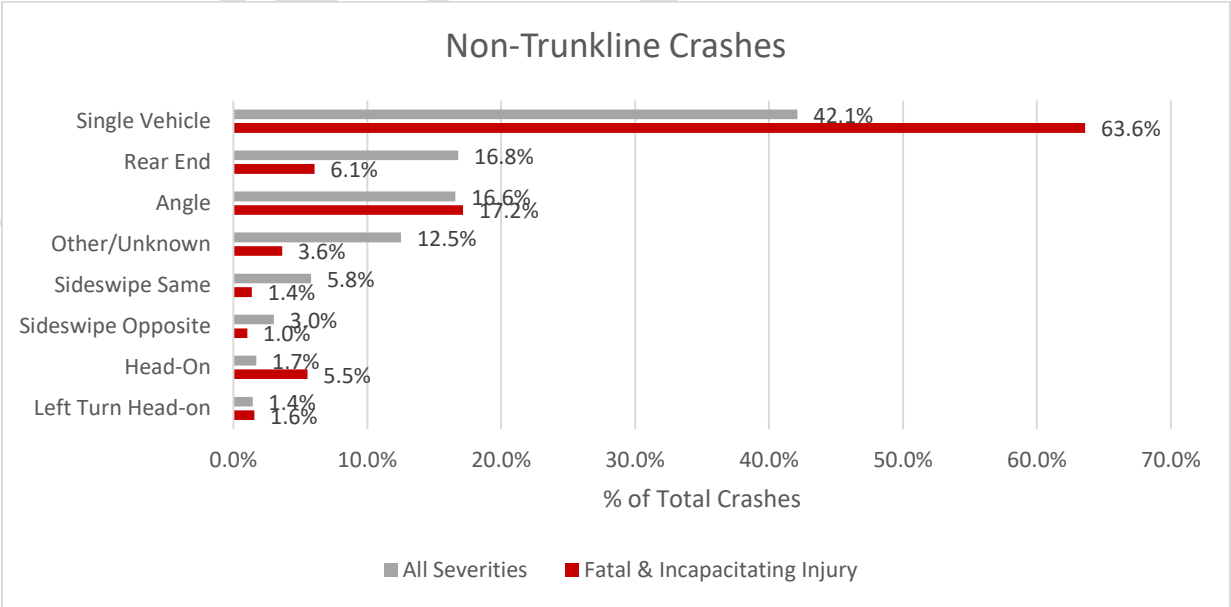


Figure 11 – Region 2 Non-Trunkline Crash Type Distribution, All Severities vs Fatal & Incapacitating Injuries

When considering crash distributions by month of year, a distinct increase can be seen in both the State, region, and local road systems data during the winter months, as shown in Figure 12. It is particularly pronounced for the Region 2 however, with the crashes occurring during the months of December, January, and February accounting for approximately a third (32.6 percent) of all crashes during the study period. As shown, the distribution of crashes by month for the local road system tends to track fairly closely with the region as a whole.

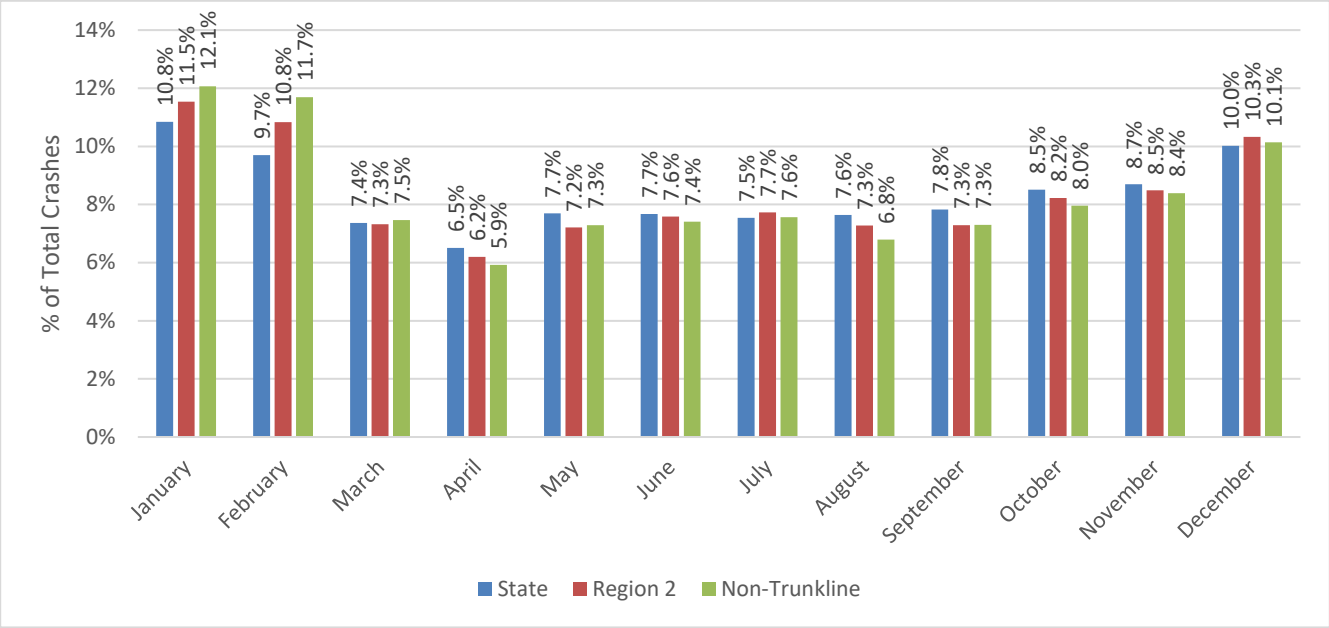


Figure 12 – Region 2 Monthly Crash Distribution, All Severities

Figure 13 provides a comparison between crashes of all severities and fatal and serious injury crashes on non-trunkline roads in the region. As shown in the figure, while all crashes tend to peak in the winter months, fatal and serious injury crashes peaked during the summer and fall with nearly a third of the fatal and incapacitating injury crashes (31.5 percent) occurring in the three months of June, July, and August.

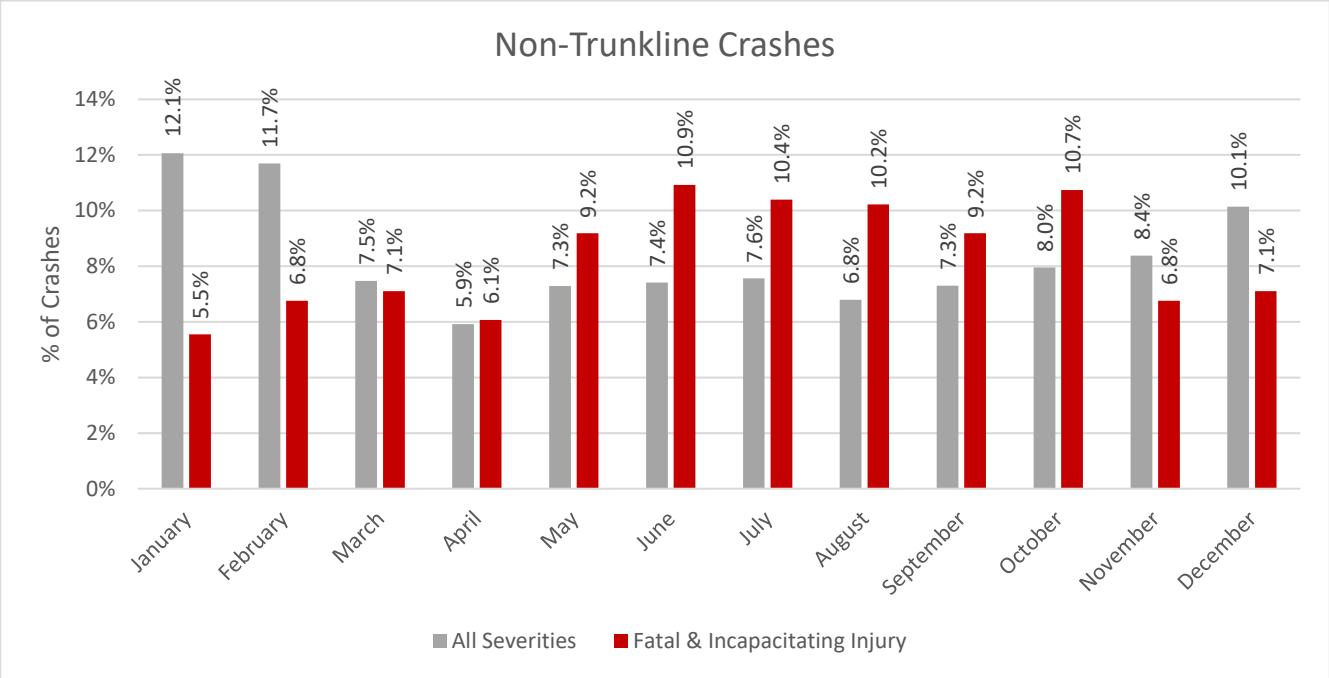


Figure 13 – Region 2 Non-Trunkline Monthly Crash Distribution, All Severities vs. Fatal & Incapacitating Injuries

Figure 14 generally supports the results provided in Figure 12. Region 2 and Local Road Systems tended to experience a slightly greater portion of snowy, icy, and slushy road crashes than the State as a whole.

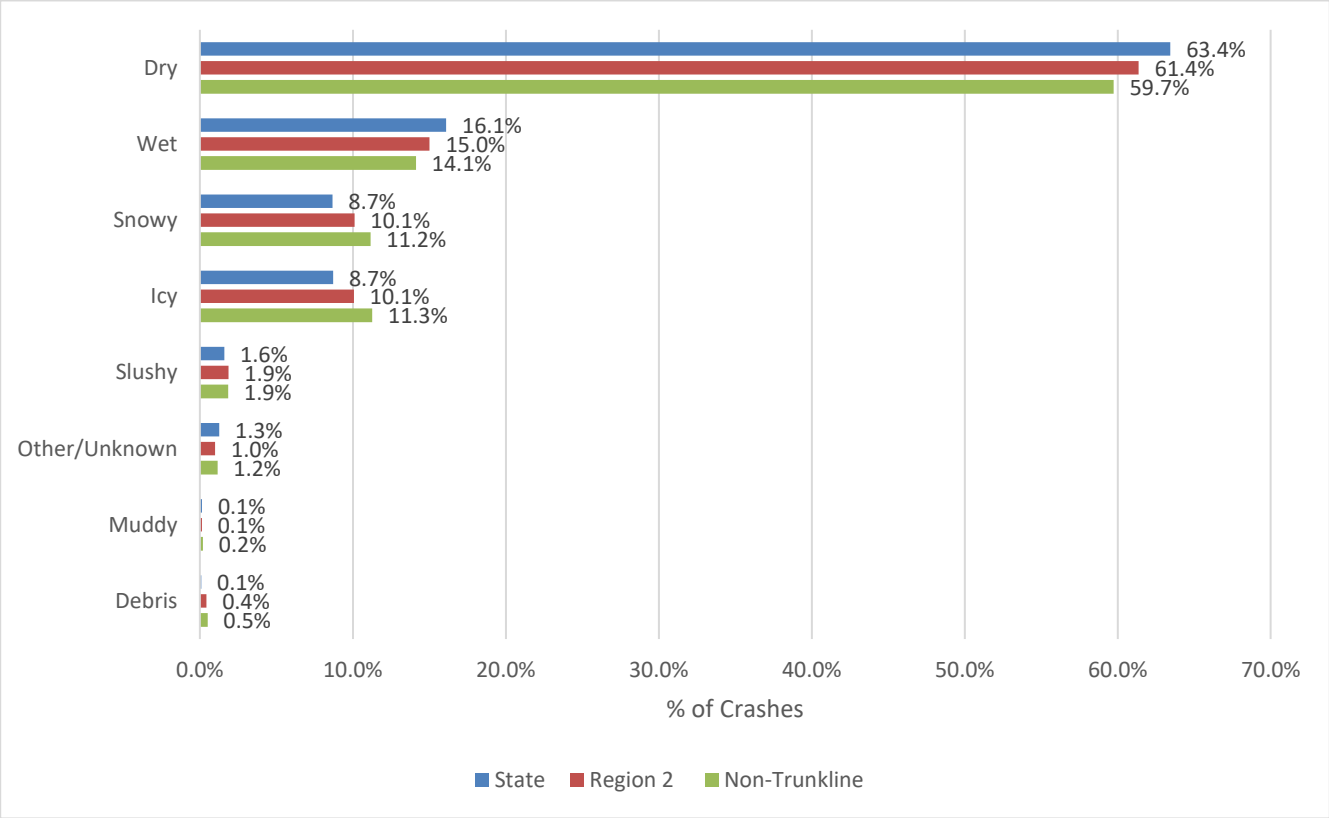


Figure 14 – Region 2 Road Condition Distribution, All Severities

Figure 15 provides a comparison between non-trunkline crashes occurring in the region and fatal and serious injuries. There is a greater proportion of fatal and serious injuries occurring under dry conditions than crashes in general.

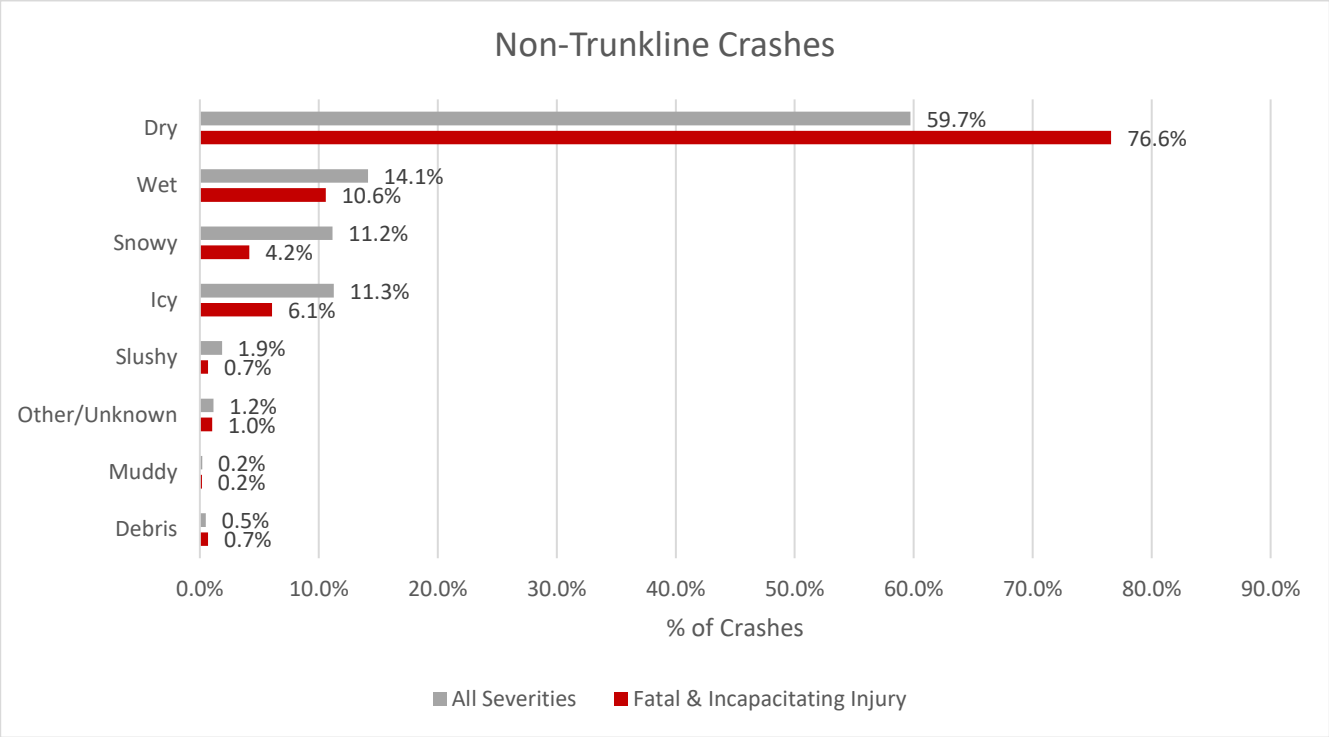


Figure 15 - Region 2 Non-Trunkline Road Condition Distribution, All Severities vs Fatal & Incapacitating Injuries

2.1.3 Stakeholder Consultation

Several preliminary trends were identified in the 2015 data and have been included here in the following table. Unless otherwise stated, all values are based on fatal and incapacitating injury crash counts.

Table 3 – Initial 2015 Trends

	2014				2015
Total Crashes	6,493	Decreased by	4.5%	to	6,201
Incapacitating Crashes	133	Increased by	10.5%	to	147
Fatal Crashes	30	Decreased by	13.3%	to	26
Single Vehicle Crashes	60	Increased by	33.3%	to	80
Angle Crashes	31	Decreased by	22.6%	to	24
Head on Crashes	15	Increased by	26.7%	to	19
Non-motorized	13	Increased by	38.5%	to	18
Impaired Driver Related Crashes	29	Increased by	41.4%	to	41
Older Driver Related Crashes	39	Decreased by	5.1%	to	37
Younger Driver Related Crashes	52	Decreased by	1.9%	to	51

As shown, initial high level trends are mixed when comparing 2014 and 2015 crash data. It is important to note that due to the nature of traffic crashes, it is inappropriate to draw any strong conclusions from

the data presented in this section. However, it is useful to understand the basic observations and consider them when analyzing the full data set as it becomes accessible.

2.1.4 Stakeholder Consultation

As part of the Regional Traffic Safety Plan development process a series of potential Emphasis Areas have been identified. These are based on a combination of historic crash data as well as feedback and discussions with relevant stakeholders.

On Monday, September 12, 2016 a meeting was conducted with a wide range of stakeholders, consisting of members of local organizations encompassing the Four E's of a Regional Traffic Safety Plan (RTSP). A follow-up meeting was held on Thursday, December 1, 2016 to meet with members of the steering committee to discuss the preliminary list of emphasis areas. One of the items of discussion for these meetings included the identification of potential Emphasis Areas. The following list includes a representative sample of the topics discussed at these meetings:

- Distracted Driving
- Young Drivers
- Older Drivers
- Speed Enforcement
- Bicycles on two-lane roads without shoulders or other facilities
- Ped & Bike Involved Crashes
- Hazardous Actions
- Mixed Speed/Road Users
- Carriages with no type of delineation
- Overgrown Vegetation
- Stop Controlled Intersections
- Impaired driving

The issues discussed at each of the meetings were used to help further the crash data analysis and informed the identification and selection of Emphasis Areas. These areas are discussed in the following sections.

2.2 Emphasis Areas and Strategies

The concerns and topics discussed at the stakeholder meeting were used to guide and focus the crash analysis and identify the Emphasis Areas. Based on the crash analysis and working group discussions, the following Emphasis Areas for the RTSP have been identified and approved during a stakeholder meeting held on March 27, 2017, in alphabetical order:

- At-risk driver age groups (ages 15-to-24 and 65-and-older)
- Driver Behavior (Speeding, Distracted, Drowsy, Etc.),
- Impaired Drivers
- Intersection Related (signalized, stop controlled)
- Non-Motorized (pedestrians, bicyclists, carriages)
- Single Vehicle Crashes (run-off-road crashes)

These Emphasis Areas collectively account for 98.3 percent of the fatal and incapacitating injury crashes which have occurred in the region on non-trunkline roads. Of the 577 fatal or incapacitating injury crashes reported in the region from 2010 to 2014, 567 fall under at least one of the seven proposed Emphasis Areas. Table 4 provides a basic breakdown of each Emphasis Area, and their portion of fatal, incapacitating injury, and total crashes. It should be noted that as there are multiple contributing factors to each crash, some crashes have been counted under more than one emphasis area. To account for this, a percentage was also calculated for all emphasis areas. This is important as we may never know which specific treatment will be the one that will get a driver home safely. Additionally, deer related crashes have been removed.

Table 4 – Portion of Northeast Regional Non-Trunkline Crashes by Emphasis Area, 2010 - 2014

Emphasis Area	Portion of *17,351* Total Crashes	Portion of *577* Fatal & Incapacitating Injury Crashes
At-risk driver age group	48.9%	47.1%
Driver Behavior	65.4%	67.9%
Impaired Drivers	5.7%	19.6%
Intersection Related	54.0%	44.7%
Non-Motorized	1.6%	10.6%
Single Vehicle Crashes	37.7%	52.5%
All Emphasis Area Related Crashes	**94.8%**	**98.3%**

A list of applicable strategies is provided for each emphasis area. A description for each strategy is provided in **Appendix A: Strategy Toolbox**

2.2.1 At-risk Driver Age Groups (ages 15-to-24 and 65-years-and-older)

As illustrated in Figure 16, half of the crashes that occurred on a non-trunkline road in the Region 2 involved either a younger driver and/or an older driver. Figure 17 highlights local road locations which experienced at least one fatal and / or incapacitating injury during the five-year period (2010 – 2014). Specific details regarding the top locations are provided in Appendix B (per emphasis area) and Appendix D (per county).

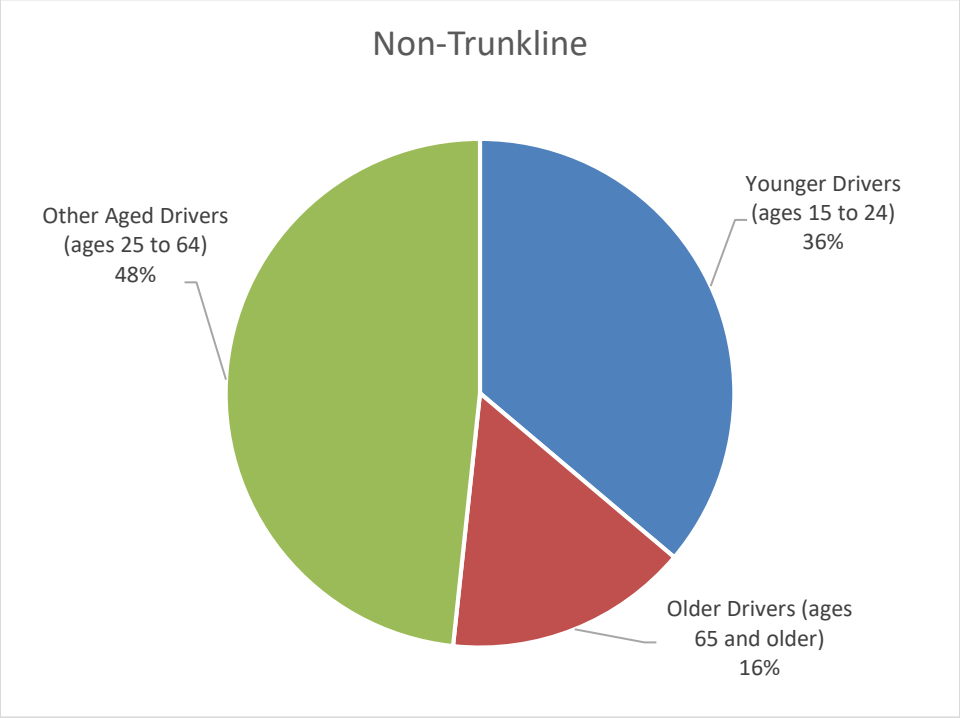


Figure 16 – Crash Comparison by Age Groups

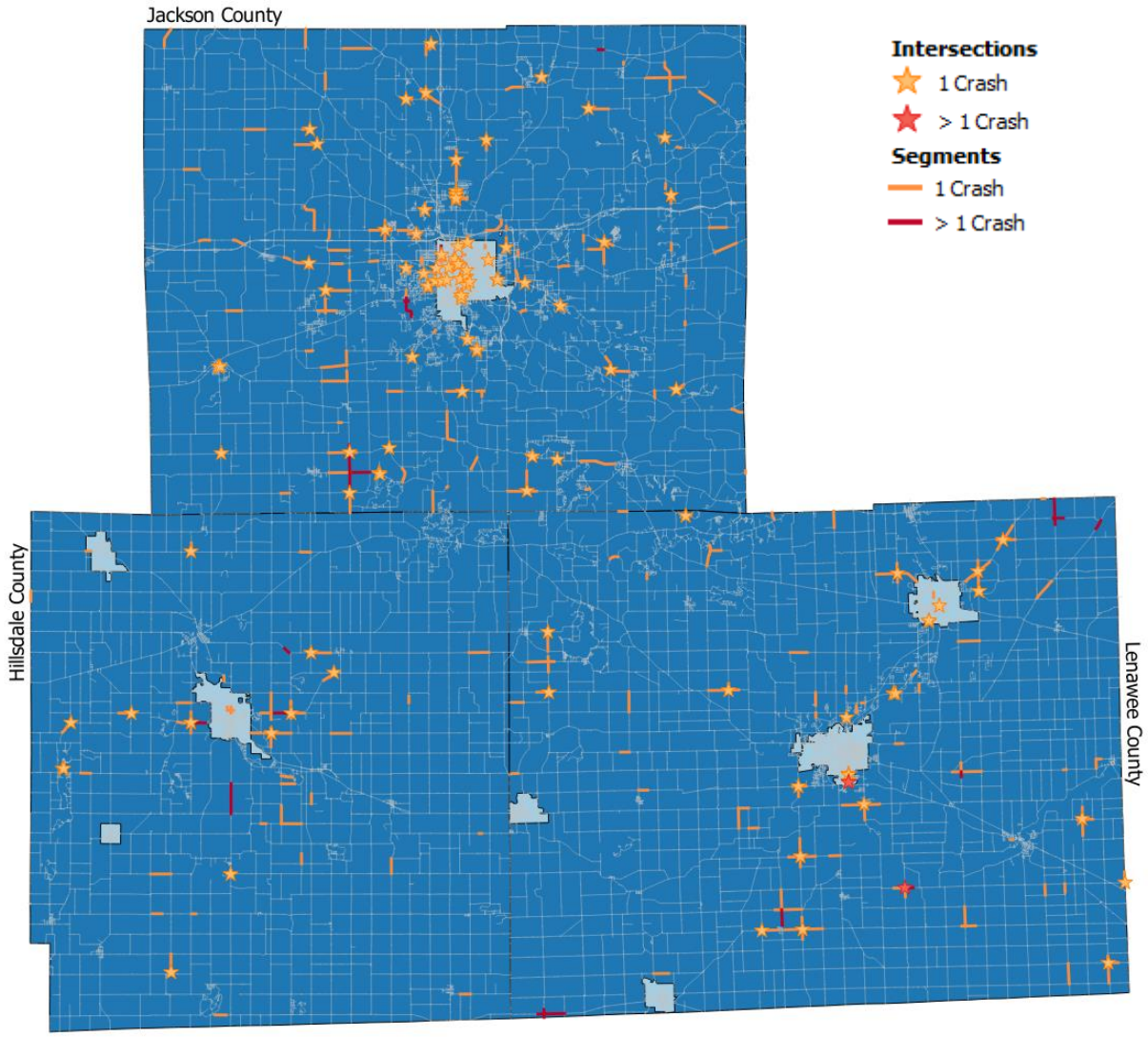


Figure 17 – At-risk Driver Age Related Fatal & Incapacitating Injury Crash Locations

Younger drivers, by definition, have less experience driving than other drivers. This is paired with a propensity to take greater risks and potentially misjudge circumstances and situations out on the road. Region 2 has historically experienced a greater rate of younger driver crashes than the State however in recent years' younger driver crashes in the region have dipped below the State rate, as shown in Figure 18. Nonetheless additional consideration should be given to address younger driver crashes in the region.

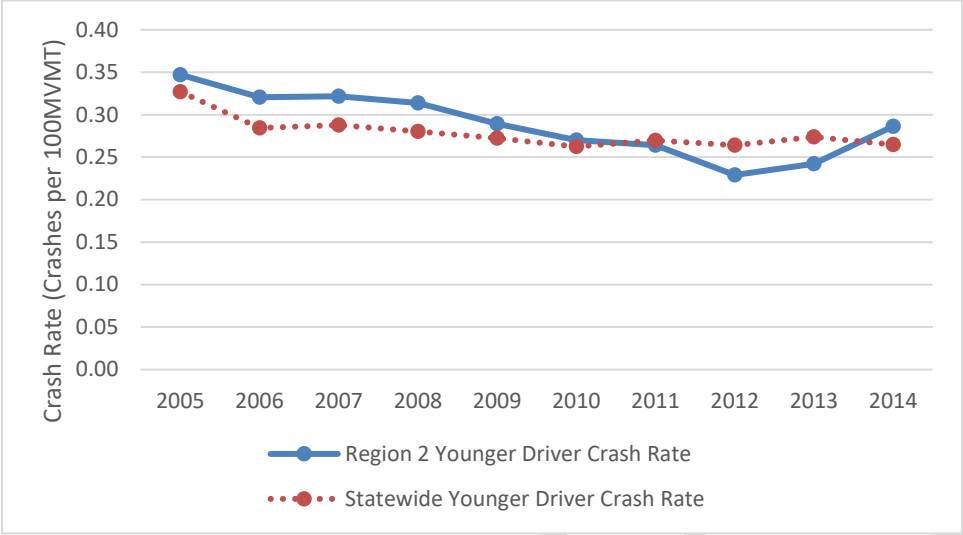


Figure 18 – Young Driver (<25) Crash Rate Comparison

Typically, as individuals age they are faced with diminished vision, hearing, reflexes, mobility, and cognitive functions. This can have a negative impact on their ability to drive and respond to potentially rapidly changing situations. Additionally, older drivers have a reduced ability to withstand physical impacts sustained in a crash. This is evidenced in part by the increased proportion of older driver crashes which result in a fatal or serious injury as compared to the population as a whole illustrated in Figure 19.

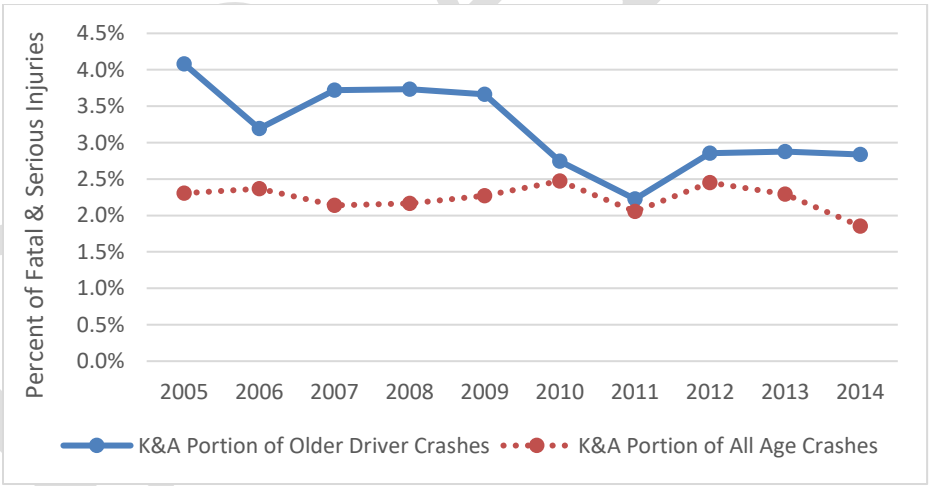


Figure 19 – Comparison of Fatal and Serious Injury Proportions for Older Drivers

Strategies:

- Driver Training Refresher Course
- Young Driver Education and Enforcement Outreach
- Review Signing, Traffic Control, and other Roadside Component
- Review Transit Availability and Accessibility

2.2.2 Driver Behavior

Previous studies have shown that driver behavior plays a role in the vast majority of traffic crashes. The majority of all fatal and serious injury crashes were associated with at least one driver related issue although the driver condition information is sometimes underrepresented in the crash data. While a wide range of potential actions or issues could be included under this category, for the purposes of this analysis the categories listed below were considered to be related to driver behavior. The non-trunkline 5-year fatal and incapacitating crash frequency and total crash frequency accompanies each related category in descending order by K&A crashes. Figure 20 highlights local road locations which experienced at least one fatal and / or incapacitating injury during the five-year period (2010 – 2014). Specific details regarding the top locations are provided in Appendix B (per emphasis area) and Appendix D (per county).

Driver Condition	K&A	Total
○ Driver Distracted	13	225
○ Fatigue	5	83
○ Asleep	4	83
○ Driver Using Cellular Phone	2	41

Cited Hazardous Action	K&A	Total
○ Speed Too Fast	3,031	117
○ Failed to Yield	2,382	77
○ Careless or Negligent Driving	1,237	71
○ Reckless Driving	296	40
○ Fail to Stop in Assured Clear Distance	2,224	34
○ Disobeyed Traffic Control	419	30
○ Improper Lane Use	486	6
○ Improper Turn	184	4
○ Improper Backing	861	3
○ Improper Passing	121	2
○ Improper Signal	31	1

Speeding, failure to yield, careless/negligent driving, and reckless driving are the top four greatest contributing factors in driver behavior related crashes. Speeding increases the risk of serious crashes due to evasive maneuvers and limited stopping distances.

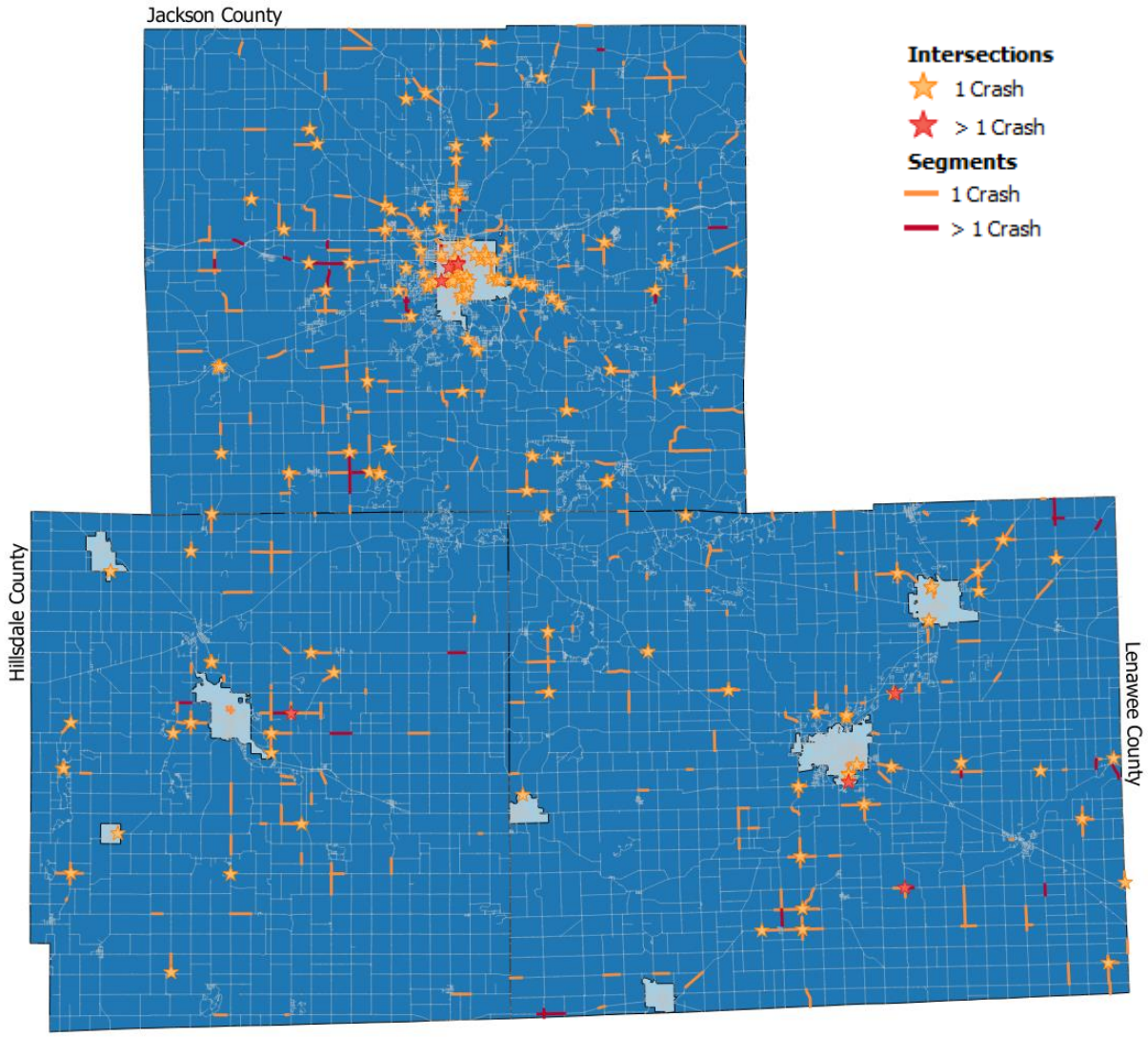


Figure 20 – Driver Behavior Related Fatal & Incapacitating Injury Crash Locations

Strategies:

- Distracted Driver Education Campaigns
- Mobile & Fixed Speed Feedback Signs
- Randomized Enforcement Locations
- Traffic Calming Projects

2.2.3 Impaired Drivers

Driving under the influence of drugs or alcohol is a serious issue as it limits the ability of the driver to comprehend and respond to hazards. This not only endangers the driver and any passengers in their vehicle but other drivers, bystanders, and property as well. Impaired driver crashes in the Region 2 have generally fallen below the statewide rate, as shown in Figure 21. As detailed in Table 4, six percent of all crashes on local roads involved an impaired driver. However, when considering fatal and serious injury crashes specifically the proportion jumps to nearly 21 percent (113 out of 577). The need to address this over representation was supported as a concern raised during the stakeholder discussion. Figure 22 highlights local road locations which experienced at least one fatal and / or incapacitating injury during the five-year period (2010 – 2014). Specific details regarding the top locations are provided in Appendix B (per emphasis area) and Appendix D (per county).

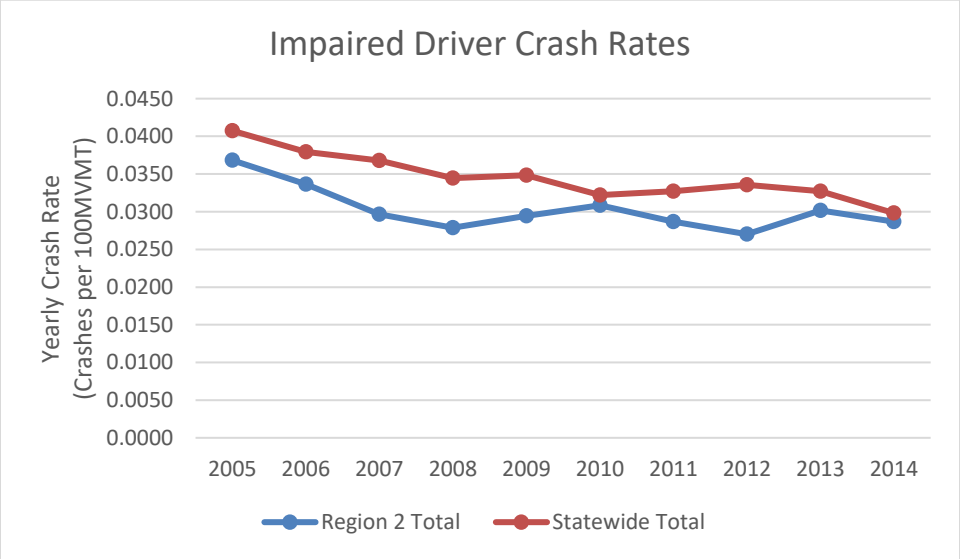


Figure 21 – Impaired Driver Crash Rates

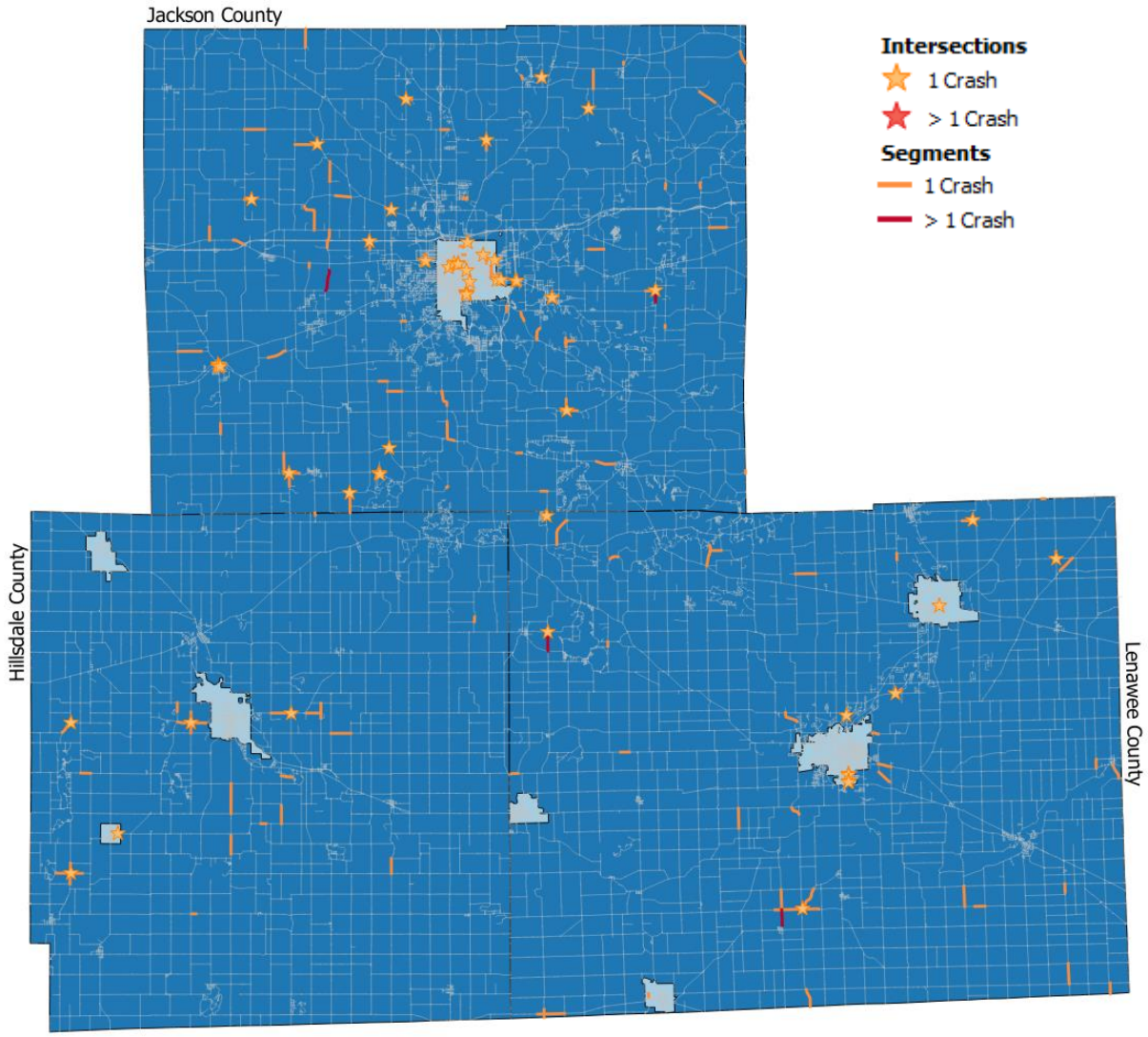


Figure 22 – Impaired Driver Related Fatal & Incapacitating Injury Crash Locations

Strategies:

- Drug Recognition Expert (DRE) Training
- Impaired Driving Education Campaign
- Impaired Driving Enforcement Zones

2.2.4 Intersection Related

Intersections represent some of the most complex areas of interaction as they bring together conflicting traffic flows. To further complicate things they draw all modes of transportation including motor vehicles, transit services, bicyclists, and pedestrians into a central area. This significantly increases the potential for crashes in general, as well as fatal and serious injury crashes. From 2010 through 2014, more than half of the crashes in Region 2 occurred within 150 feet of an intersection (16,102 out of 30,817). Of the intersection-related crashes, half occurred at either a stop controlled or signalized intersection. The proportion between stop controlled and signalized intersections are 49 percent to 51 percent, respectively. However, the majority of fatal and incapacitating injury type crashes occurred at stop controlled intersections (excluding non-controlled locations). Figure 24 highlights local road locations which experienced at least one fatal and / or incapacitating injury during the five-year period (2010 – 2014). Specific details regarding the top locations are provided in Appendix B (per emphasis area) and Appendix D (per county).

It should be noted that the Other category accounts for the majority of intersection related crashes and appears to be used when the crash occurs along the free flowing or uncontrolled approach of an intersection (i.e. private drive, free flowing approach of a partial stop controlled location, etc.). This limits the practicality of drawing any concrete conclusions as Other traffic control flagged crashes occur at signalized, stop, and yield controlled locations in addition to truly uncontrolled intersections.

Table 5 – Proportion of Intersection Related Crashes

	Intersection Crashes (2010-14)			Percent of Region Crashes
	Stop	Signal	Other	
Total Crashes	4,002	4,174	7,926	52.2% of all crashes
Fatal & Injury Crashes	129	76	222	43.6% of fatal and injury crashes
Fatal Crashes	22	7	36	38.9% of fatal crashes

A wide range of factors may contribute to intersection related crashes. Figure 23 illustrates a couple examples of different types of contributing factors observed in the region. Vegetation and/or objects in the corners of an intersection may obstruct sight distance between stopped vehicles and cross traffic. Traffic control visibility may be limited on curved approaches, skewed intersections, following larger vehicles, among other factors.

Figure 23 – Intersection Related Contributing Factors

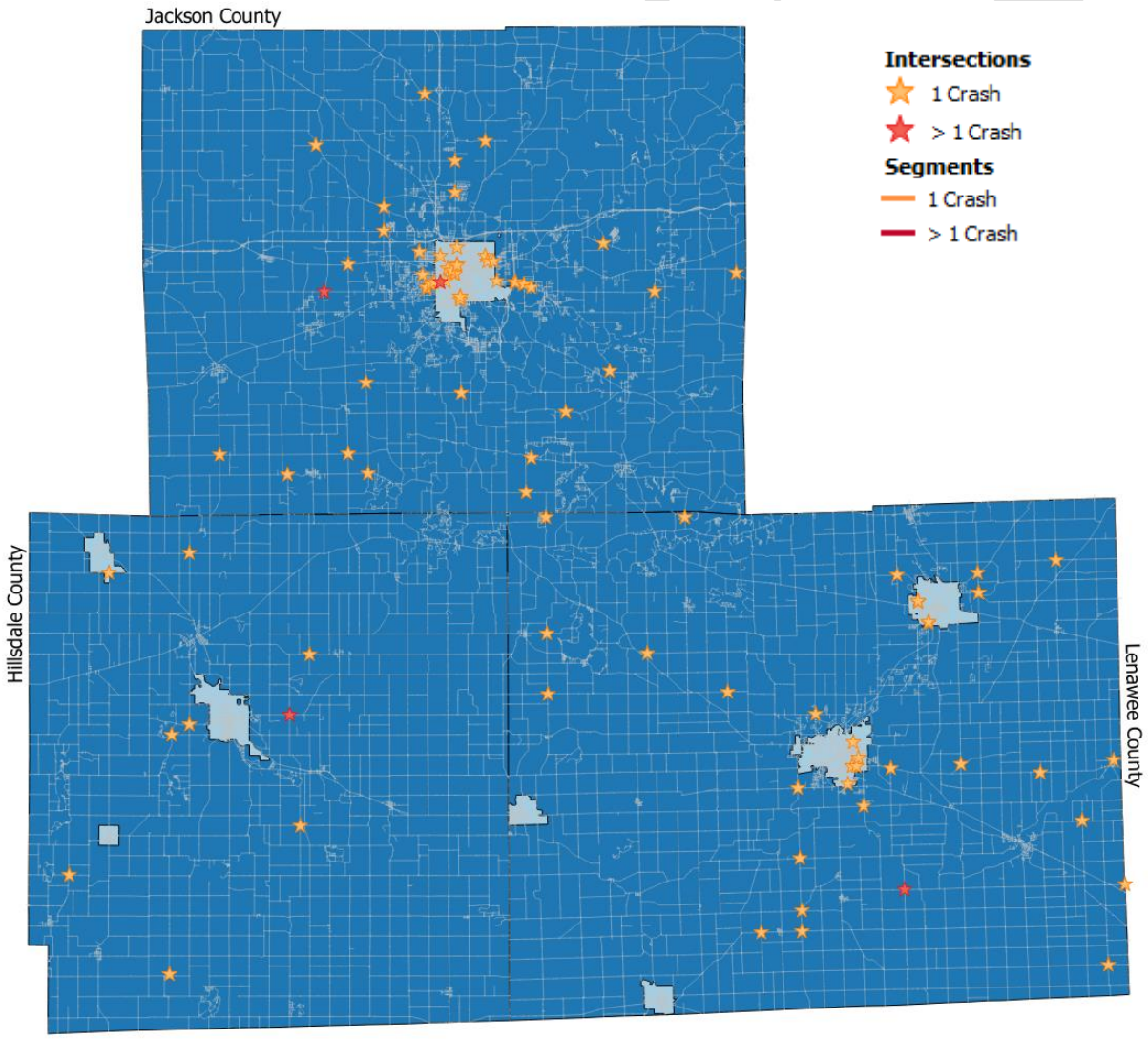


Figure 24 – Intersection Related Fatal & Incapacitating Injury Crash Locations

Additionally, the local road network (non-trunkline) experienced a greater number of intersection crashes and severe and fatal crashes than the trunkline network. Figure 25 provides a summary of intersection crashes by network and severity.

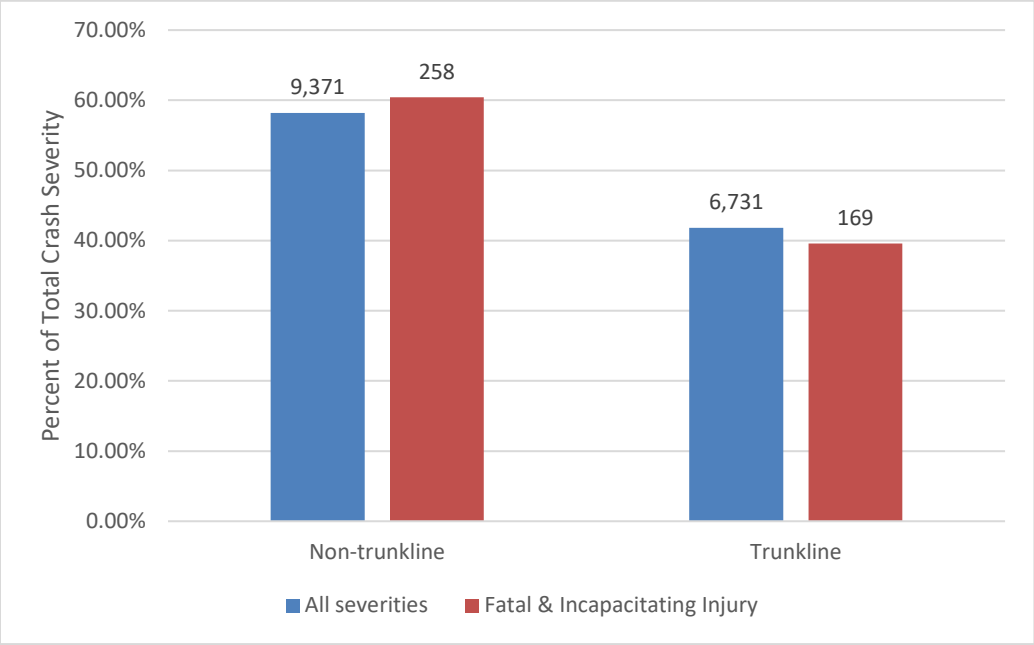


Figure 25 – Intersection Crashes by Road Network

As shown in Figure 26, the most prevalent crash types at intersections in the region are rear end and angle type crashes. Treatments may be applied to reduce these types of crashes at a variety of intersection types.

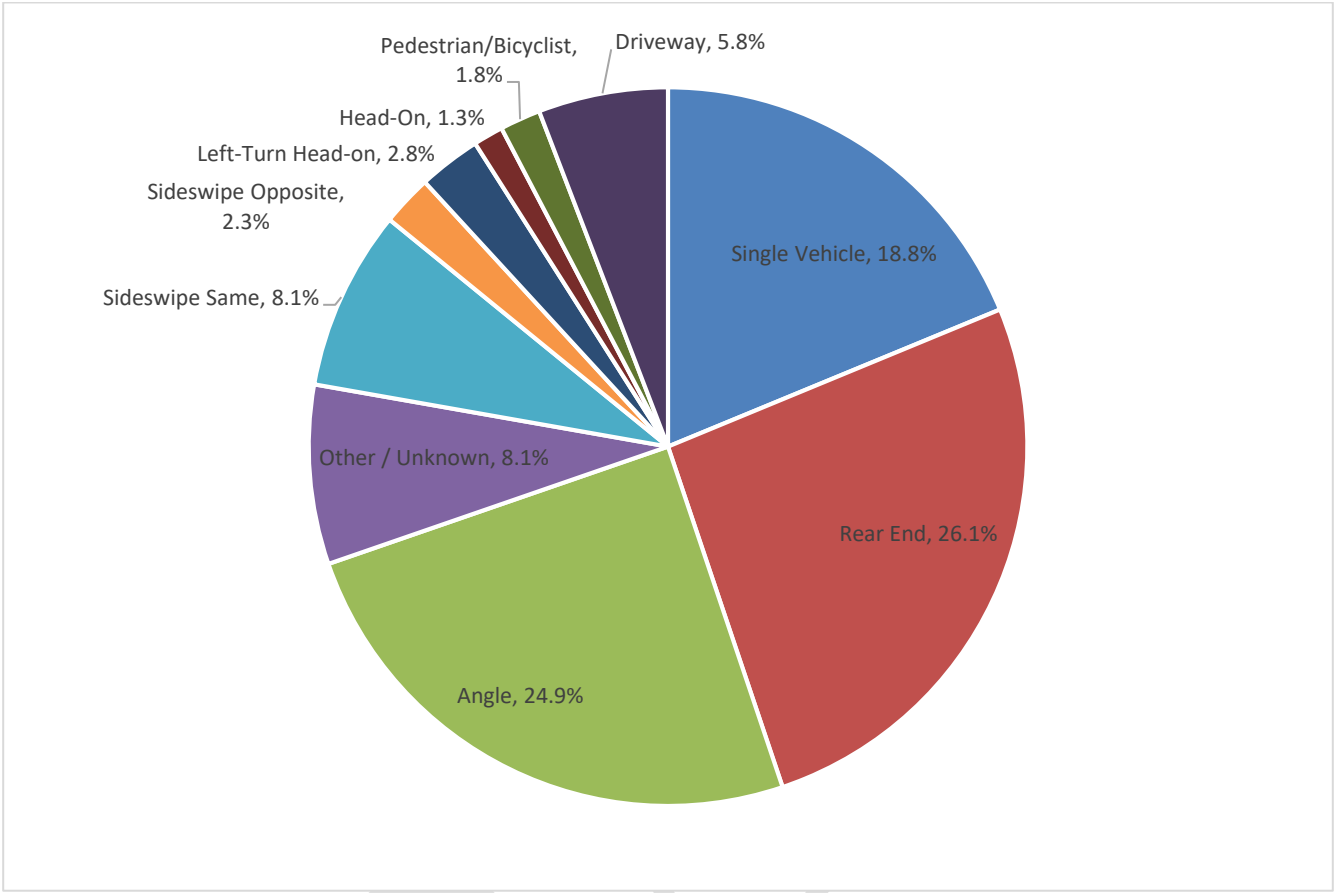


Figure 26 – Intersection Related Crash Types

Strategies:

- Advanced Intersection Signage
- Improve Traffic Control Visibility
- Install Transverse Rumble Strips
- Review Intersection Lighting
- Review Intersection Traffic Control
- Sight Distance Clearance & Maintenance

2.2.5 Non-motorized

When considering crashes of all severities, fatal to property damage, pedestrian and bicycle involved crashes account for approximately 1.7% of all non-trunkline crashes. However, when considering fatal and serious injury crashes specifically the proportion jumps to more than ten percent (61 out of 577). The need to address this overrepresentation was supported as a significant concern raised during stakeholder discussion. Specific concerns include: 1) bicyclists on two-lane roadways without shoulders or other facilities, 2) mixed speeds between the different road users, and 3) carriages with no type of delineation. While the likelihood of a non-motorized crash occurring is relatively low, the probability that any single non-motorized crash will result in an injury or fatality is disproportionately high. Figure 29 highlights local road locations which experienced at least one fatal and / or incapacitating injury during the five-year period (2010 – 2014). Specific details regarding the top locations are provided in Appendix B (per emphasis area) and Appendix D (per county).

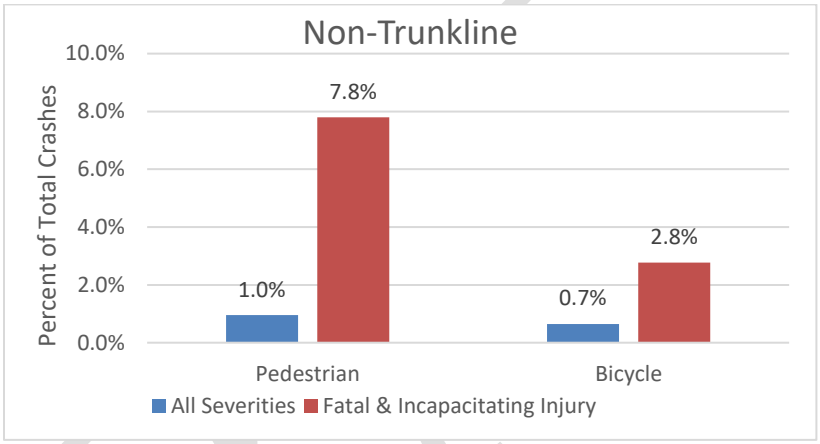


Figure 27 – Non-motorized Related Crashes

Figure 28 – Examples of Non-Motorized Users in Region 2

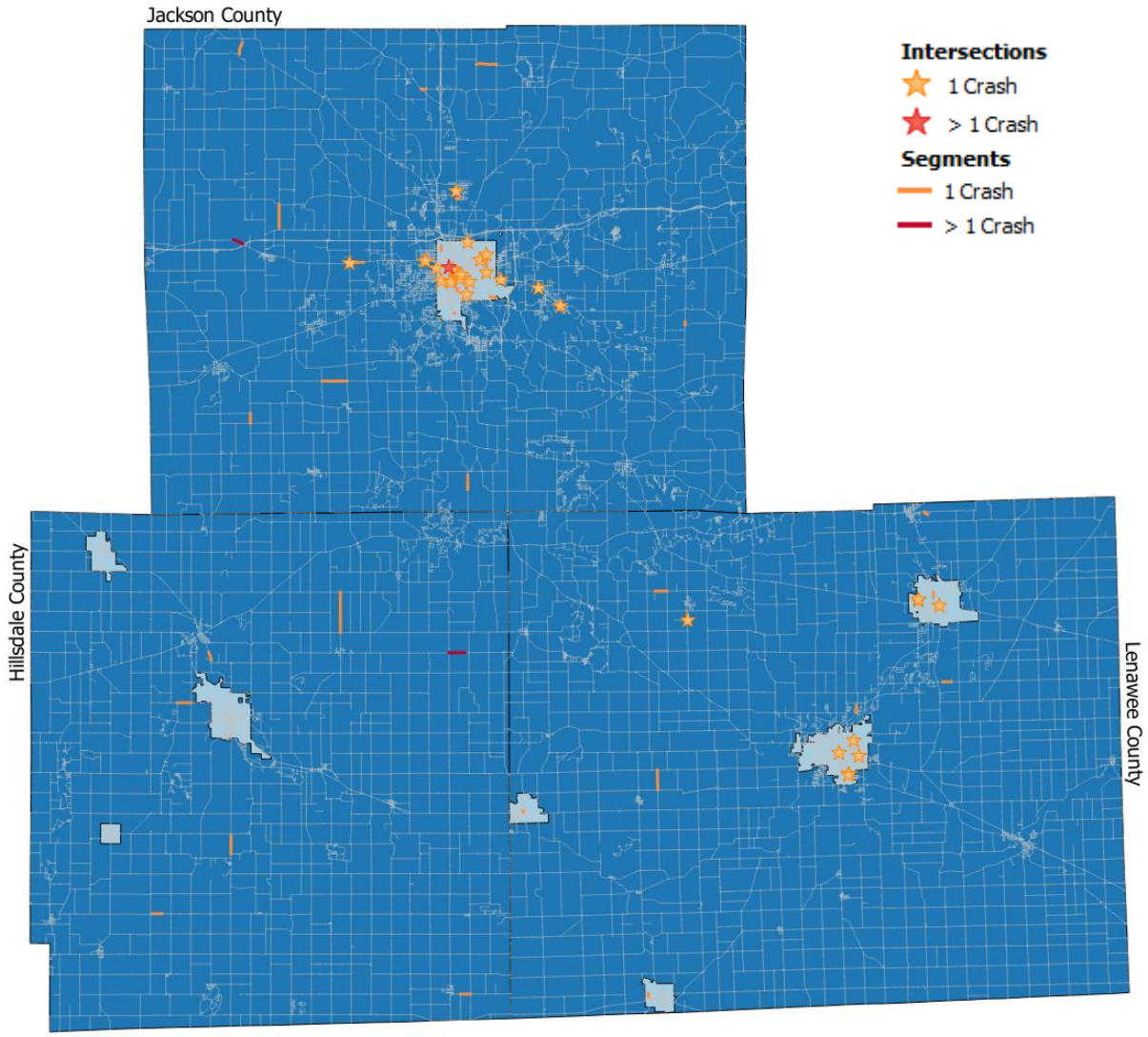


Figure 29 – Intersection Related Fatal & Incapacitating Injury Crash Locations

Strategies:

- Crosswalk Improvements
- Improve Sidewalk/Multi-use Trail Connectivity & Maintenance
- Education & Awareness Programs (e.g. "Look Twice, Save a Life")
- Review Lighting Need & Coverage

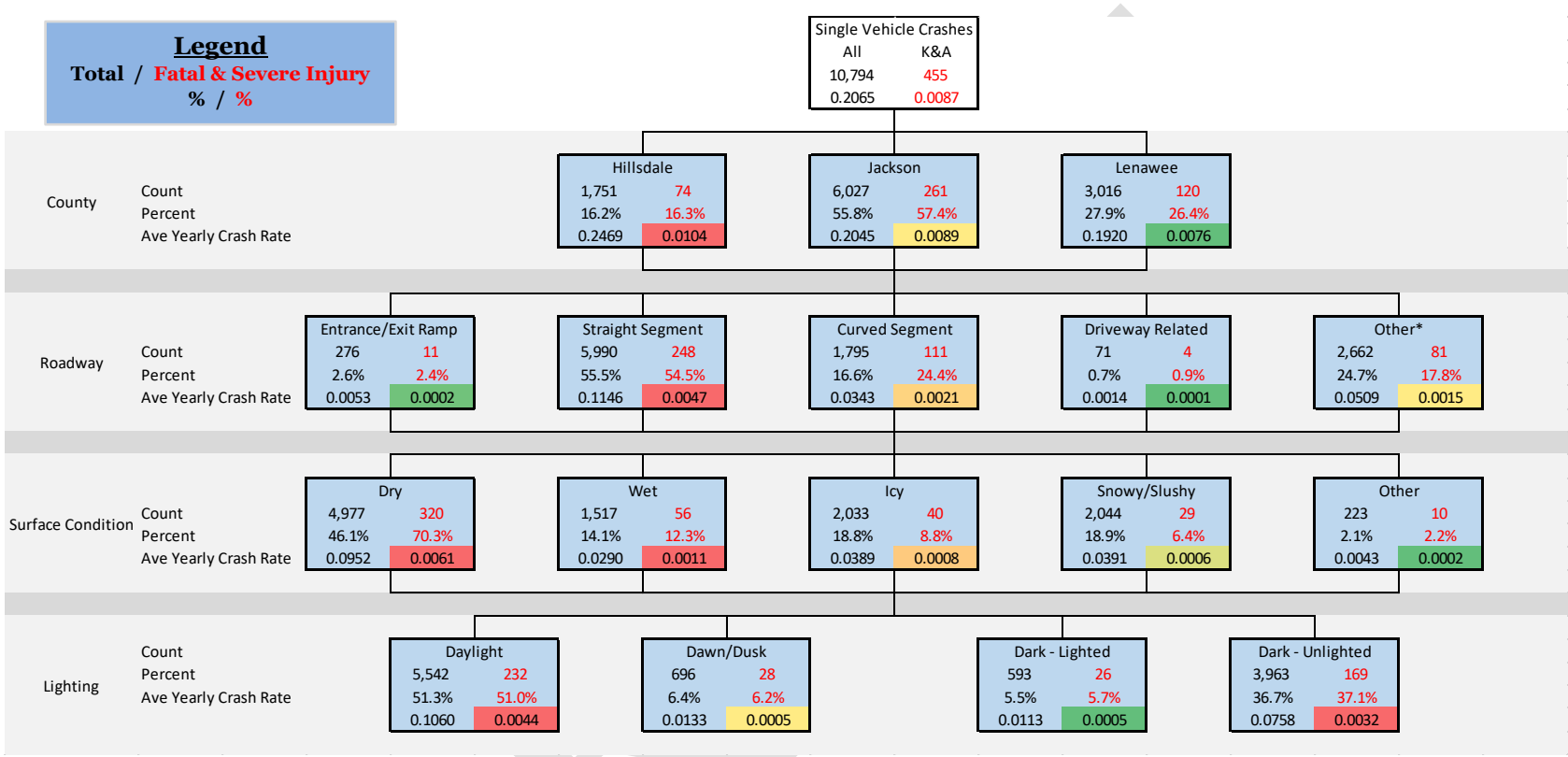
2.2.6 Single Vehicle Crashes

Single motor vehicle crashes, including run-off-road crashes, accounted for 37.7 percent of all local road crashes as detailed in Table 4. However, nearly 53 percent (303 out of 577) of all fatal and serious injury crashes that occurred on local roads in the region was a single vehicle crash; this demonstrates a higher risk of severity resulting from these types of crashes. Figure 30 illustrates the primary locations for single vehicle crashes on non-trunkline roads based on the 2010 – 2014 years of crash data for the region. Nearly 62% of all single vehicle fatal and serious injury crashes occurred on straight segments of roadway in the region and 22% occurred on curved segments of roadway. Figure 32 provides a breakdown highlighting the trends of the single vehicle crashes that occurred from 2010 to 2014 on all roads in the region. More than a third of the fatal and serious injury crashes occurred under dark, unlit, conditions.

Figure 30 – Single Vehicle Crashes on Local Roads

A wide range of factors may contribute to the potential for a single vehicle crash to occur as well as the severity of the crash and the ability of the driver to correct and recover. These contributing factors include impaired driving, drowsy or distracted driving, insufficient roadside delineation, and inclement weather or roadway surface conditions. Figure 31 provides an example of a roadside drop-off issue identified in the region which would not necessarily increase the likelihood of a crash, but would make it more difficult to recover, potentially increasing the severity of any resulting crash. Drivers faced with this situation have been known to over correct and re-enter the road crossing into oncoming traffic.

Figure 31 – Region 2 Roadside Drop-off Example



**Roadway, Other category is primarily "Other Freeway Areas"*

Figure 32 – Single Vehicle Crashes (5 years, 2010-14)

Figure 33 highlights local road locations which experienced at least one fatal and / or incapacitating injury during the five-year period (2010 – 2014). Specific details regarding the top locations are provided in Appendix B (per emphasis area) and Appendix D (per county).

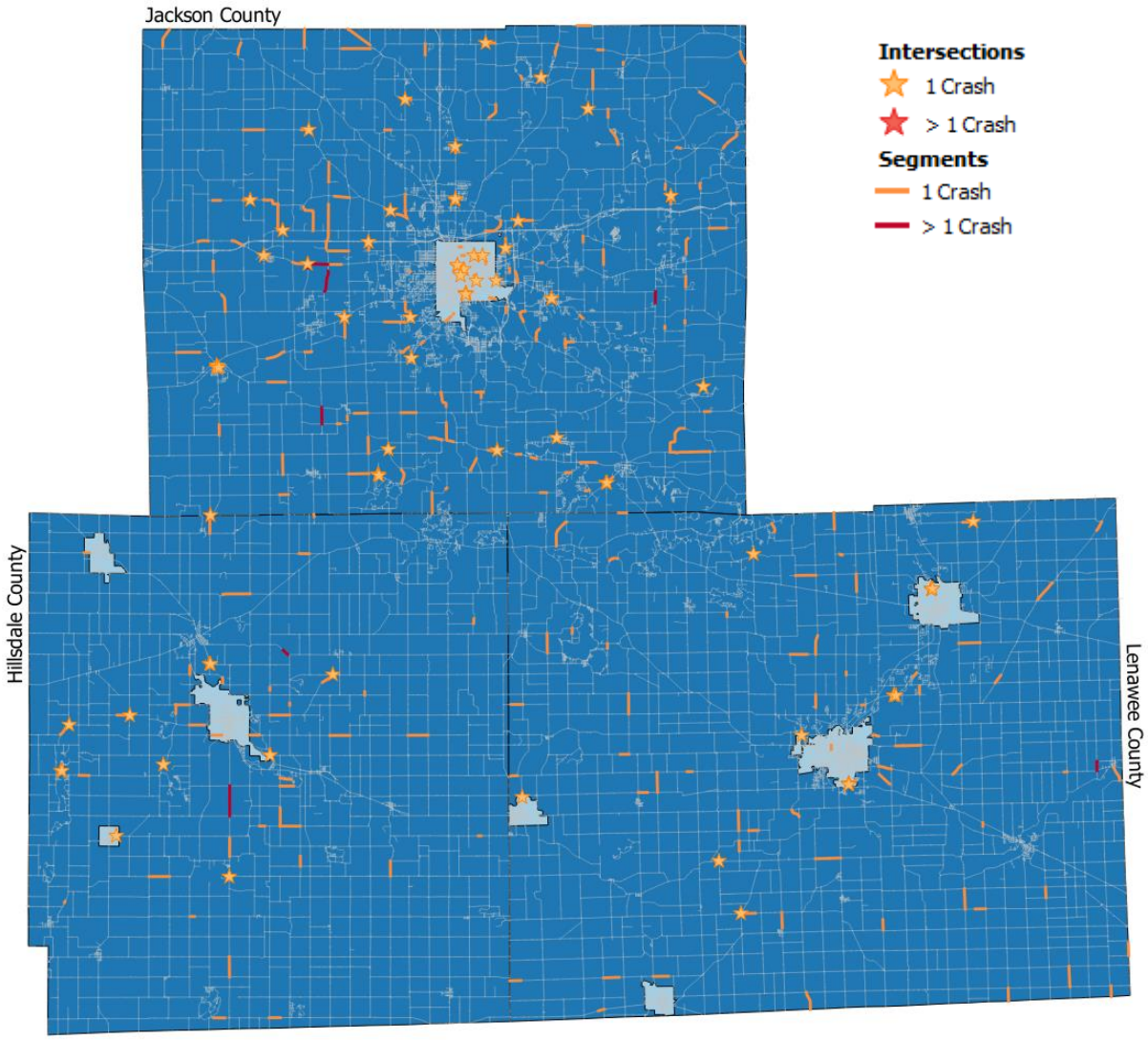


Figure 33 – Single Vehicle Related Fatal & Incapacitating Injury Crash Locations

2.3 Strategy Prioritization

Due to the interconnected nature of transportation safety and treatment strategies, countermeasures may have a varying impact for more than one emphasis area. While this can increase the complexity when attempting to quantify their overall effect, it does provide an opportunity to prioritize treatment strategies, at least in part, on the number of Emphasis Areas they have the potential to impact. Table 6 provides a rudimentary summary of the applicability of each strategy within each of the Emphasis Areas. The strategies are prioritized based on the potential number of Emphasis Areas which could be impacted by their installation, as well as the number of fatal and severe incapacitating injury crash types on local roads that each emphasis area has historically (2010-2014) been associated with. The goal is to prioritize the treatments which have the potential to impact the greatest proportion of crashes within the region.

Table 6 provides an initial prioritization of the countermeasures identified in this report. As with the Emphasis Areas and the strategies themselves, the prioritization should be reviewed and updated regularly to reflect the performance of each countermeasure and the priorities and guidance of the region.

Table 6 – Countermeasure Prioritization

Rank	Countermeasure(s)	At-risk Driver Age Groups	Driver Behavior	Impaired Drivers	Intersection Related	Non-Motorized	Single Vehicle Crashes	Total	Associated Local K&A Crashes 2010-2014
1	Driver Training Refresher Course	✓	✓					**2**	**463**
2	Improve Delineation	✓					✓	**2**	**462**
3	Randomized Enforcement Locations		✓	✓				**2**	**414**
4	Distracted Driver Education Campaigns		✓					**1**	**392**
5	Install/Expand Paved Shoulders					✓	✓	**2**	**365**
6	Review Transit Availability & Accessibility	✓		✓				**2**	**342**
7	Install Center and Edgeline Rumble Strips and or Mumble Strips						✓	**1**	**311**
8	Improve Traffic Control Visibility	✓	✓		✓			**3**	**258**
9	Review Signing, Traffic Control, and other Roadside Components	✓			✓		✓	**2**	**258**
10	Review Intersection Traffic Control				✓			**1**	**258**
10	Sight Distance Clearance & Maintenance				✓			**1**	**258**
10	Advanced Intersection Signage				✓			**1**	**258**
11	Review Lighting Need and Coverage				✓	✓	✓	**3**	**228**
12	Young Driver Education and Enforcement Outreach	✓	✓					**2**	**197**
13	Traffic Calming Projects		✓			✓		**2**	**117**
14	Mobile & Fixed Speed Feedback Signs		✓					**1**	**117**
15	Impaired Driving Education Campaign			✓				**1**	**113**
15	Impaired Driving Enforcement Zones			✓				**1**	**113**
15	DRE Training			✓				**1**	**113**
16	Install Transverse Rumble Strips				✓			**1**	**99**
17	Review Intersection Lighting				✓	✓		**2**	**82**
18	Targeted High Friction Surface Treatments						✓	**1**	**79**
18	Advanced Curve Warning and/or Chevrons						✓	**1**	**79**
19	Improve Sidewalk/Multi-Use Trail Connectivity and Maintenance					✓		**1**	**61**
19	Education and Awareness Programs					✓		**1**	**61**
20	Install Safety Edge Treatments						✓	**1**	**59**
21	Crosswalk Improvements					✓		**1**	**21**

3 Next Steps

3.1 Implementation Process

While the Region 2 Planning Commission, County Road Commissions, law enforcement, educators, and emergency responders have taken great strides towards improving road safety in the region, fatal and serious traffic crashes remain a priority to be addressed. The Emphasis Areas and potential countermeasures outlined in this report provide a foundation for the stakeholders and agencies to draw on when implementing new, or maintaining existing, traffic safety projects and programs. The Region 2 Planning Commission will continue to work with and foster strong relationships with and between the various stakeholders and agencies to help promote and coordinate these projects and programs. Additionally, the RTSP should be used in support of the yearly development of the various Transportation Improvement Plans to help identify areas where safety improvements could be incorporated into design and maintenance projects. These plans will be utilized for performance measures once more guidance from FHWA is received.

Through the continued cooperation and relationships between the Region 2 Planning Commission and related agencies, as well as between the agencies themselves, the RTSP provides a high-level document to guide the application of various transportation safety countermeasures throughout the region.

3.2 Evaluation Process

Given the rapid nature of change in today's technologically driven world, it is crucial that the RTSP is continuously updated and evaluated. Michigan enjoys one of the country's more robust traffic crash reporting systems which will be used to help evaluate the efficacy of systemic and individual safety treatments and programs. This will require continued cooperation between the various stakeholders across Hillsdale, Jackson, and Lenawee Counties. Accurate records regarding the implementation of each safety related engineering improvement, education or public awareness campaign, law enforcement program and emergency service changes should be maintained by each responsible party. This project and process information will be used in conjunction with the crash data as it becomes available to assess the impacts of each treatment on the related fatal and serious injury crashes.

In addition to the treatment evaluations conducted on a regular basis, feedback and concerns should be collected from stakeholders, relevant agencies, and the public to ensure that the most pressing concerns are included in the RTSP. This could be accomplished through a yearly, or bi-annual meeting, held with all involved agencies and surveys distributed to the public. This information, when used in conjunction with a review of the most recent crash data and treatment effectiveness evaluations, should be used to update the RTSP. In this manner, progress may be tracked against the goals identified in the plan, as well as offering an opportunity to add additional concerns and Emphasis Areas and adjust or update the goals identified in the report. As this plan is a living document, periodic review and updates should address both the crash trends and statistics as well as the opportunity to incorporate new technology, such as Connected Vehicle data and ITS infrastructure.

Additionally, as the report is updated and maintained, it should remain publicly available. In this way, the RTSP may remain a living document, adapting and adjusting according to the needs of the local communities it is designed to serve and support.

Appendices

Appendix A – Strategy Toolbox

The following sections provide brief descriptions of each of the recommended treatment strategies, organized by their associated Emphasis Area. While it is expected that several treatments may have a positive impact for more than one Emphasis Area, they are listed with their most closely associated area. Each countermeasure description will maintain the following format:

Countermeasures Name/Title	
4-"E" Area of Focus:	List of applicable focus areas
Countermeasure Definition:	Brief description of the countermeasure(s) including an example photo where applicable.
Types of crashes affected:	List of crash types most commonly addressed by the countermeasure(s).
Locations for use:	Brief description of locations commonly identified as candidate locations for the countermeasure(s).
Estimated Safety Benefit:	Range of applicable crash reduction factors obtained from the Crash Modification Factor Clearing House.
Estimated Cost Tier:	Very High High Moderate Low Minimal

At-risk driver age groups (ages 15-to-24 and 65-and-older)

Driver Training Refresher Course	
4-"E" Area of Focus:	Education
Countermeasure Definition:	Driver retraining and refresher courses could be provided to offer drivers of all ages an opportunity to renew skill sets and test their current abilities. This would not be predicated on a driver's age alone and would be open to all drivers.
Types of crashes affected:	All Crash Types
Locations for use:	N/A
Estimated Safety Benefit:	Unavailable
Estimated Cost Tier:	Low – High

Young Driver Education & Enforcement Outreach	
4-"E" Area of Focus:	Education
Countermeasure Definition:	As with other areas, education and enforcement campaigns should be used to supplement existing driver training courses to help ensure that novice drivers are able to improve their skills and experience on the road safely. This could include supplemental driver training components and working with schools and other youth organizations to improve outreach efforts.
Types of crashes affected:	All Crash Types
Locations for use:	N/A
Estimated Safety Benefit:	Unavailable
Estimated Cost Tier:	Low – Moderate

Review Signing, Traffic Control, and other Roadside Components	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	A number of countermeasures have been identified as benefiting all drivers, but especially older drivers. Use of high intensity yellow reflective sheeting, pedestrian countdown timers, and arrow per lane guidance signs among other treatments have been shown to reduce the potential for older driver and other crash types.
Types of crashes affected:	All Crash Types
Locations for use:	N/A
Estimated Safety Benefit:	Unavailable
Estimated Cost Tier:	Low – High

Review Transit Availability & Accessibility	
4-"E" Area of Focus:	Engineering Education
Countermeasure Definition:	Existing transit routes and on-demand services could be reviewed to identify any gaps in availability or connectivity. By providing more reliable, connected transit options, drivers who may not feel comfortable behind the wheel would have other options to go about their daily activities. This would benefit not only older drivers but all drivers and the general public.
Types of crashes affected:	Older Driver Involved Crashes
Locations for use:	N/A
Estimated Safety Benefit:	Unavailable
Estimated Cost Tier:	Low – High

Driver Behavior (Speeding, Distracted, Drowsy, Etc.)

Distracted Driver Education Campaign	
4-"E" Area of Focus:	Education
Countermeasure Definition:	Employing a range of education and training campaigns and messages to have a positive influence on driver behavior. Some well-known examples include education and enforcement campaigns such as "Click It or Ticket" and "Over the Limit, Under Arrest". Distracted driving education campaigns have increasingly been added to the list of campaigns.
Types of crashes affected:	N/A
Locations for use:	Known problem locations experiencing higher violation rates in general.
Estimated Safety Benefit:	N/A
Estimated Cost Tier:	Moderate

Mobile & Fixed Speed Feedback Signs	
4-"E" Area of Focus:	Enforcement Education
Countermeasure Definition:	Mobile Speed Trailers and fixed speed feedback sign installations may be placed at locations experiencing higher rates of speed violations. These devices detect and display the speed of the oncoming vehicle and are often paired with supplemental speed limit signs. This provides the driver with real-time feedback and reinforces the speed limit.  **Source: FHWA**
Types of crashes affected:	N/A
Locations for use:	Areas with higher proportions of speed violations or areas with increased non-motorized traffic.
Estimated Safety Benefit:	5 percent reduction in all crashes of all types in rural areas
Estimated Cost Tier:	Low

Randomized Enforcement Locations

4-"E" Area of Focus:	Enforcement Emergency Response
Countermeasure Definition:	The presence of law enforcement tends to provide a calming presence for traffic flow and encourages drivers to obey the speed limits and other traffic laws. While increasing the number of officers can be beneficial, randomizing the patrols and locations can also help. By changing staging and monitoring points for law enforcement, drivers have a more difficult time avoiding known enforcement areas, effectively increasing the influence of law enforcement in the area.
Types of crashes affected:	N/A
Locations for use:	Known problem locations experiencing higher violation rates in general.
Estimated Safety Benefit:	N/A
Estimated Cost Tier:	Moderate

Traffic Calming Projects	
4-"E" Area of Focus:	Engineering Education
Countermeasure Definition:	 **Source: FHWA** Several methods exist to help lower traffic speeds in lower volume areas. As drivers tend to travel at speeds they feel comfortable at rather than posted speed limits, steps can be taken to safely lower the speed drivers feel comfortable driving at. Some examples include narrowing lane widths, installing/allowing on-street parking, installing curb bump-outs, etc.
Types of crashes affected:	N/A
Locations for use:	Lower volume and speed areas experiencing higher rates of speed violations or areas with higher non-motorized traffic.
Estimated Safety Benefit:	N/A
Estimated Cost Tier:	Low – Very High

Impaired Drivers

Drug Recognition Expert (DRE) Training	
4-"E" Area of Focus:	Enforcement Education
Countermeasure Definition:	Michigan offers a series of training courses to assist officers in identifying potentially intoxicated drivers based on driving behaviors and other cues and signals. Three programs provide the backbone of the training including the Standardized Field Sobriety Testing Program (SFST), the Advanced Roadside Impaired Driving Enforcement Program (ARIDE), and finally the Drug Recognition Expert program (DRE).
Types of crashes affected:	DUI & DWI Crashes
Locations for use:	Known problem locations experiencing higher violation rates.
Estimated Safety Benefit:	Unavailable
Estimated Cost Tier:	Low

Source: Michigan State Police OWI Enforcement Training

Impaired Driver Education Campaign	
4-"E" Area of Focus:	Education
Countermeasure Definition:	Due in part to past education campaigns, the vast majority of drivers view drunk driving as a negative behavior. It is important to continue these efforts and inform drivers and the general public of the risk and consequences of driving while impaired. This extends to increases in the occurrence and awareness of drivers impaired through drug use. Successes and lessons learned from drunk driving educations campaigns should be applied to parallel campaigns designed to drive down instances of drug use and driving.
Types of crashes affected:	DUI & DWI Crashes
Locations for use:	N/A
Estimated Safety Benefit:	Unavailable
Estimated Cost Tier:	Low – Moderate

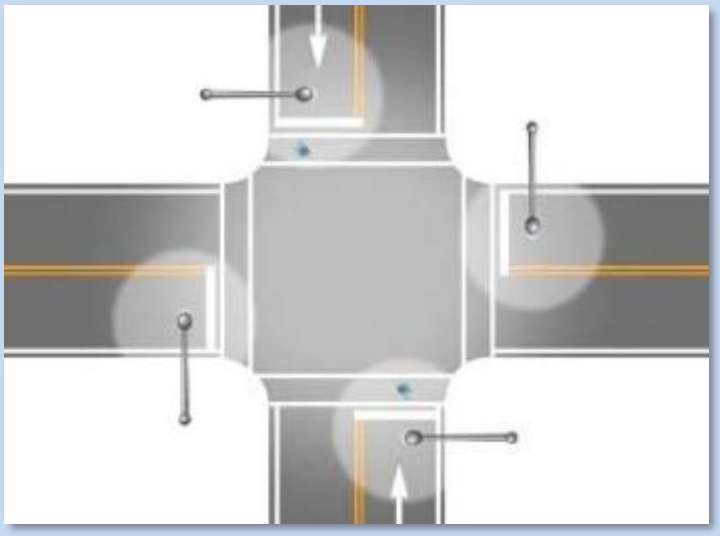
Impaired Driving Enforcement Zones	
4-"E" Area of Focus:	Enforcement Emergency Response
Countermeasure Definition:	Enforcement zones can serve as a visible deterrent to individuals considering driving after drinking or taking other substances. They also serve as an active measure used to remove impaired drivers from the road, helping to reduce crashes involving impaired drivers.
Types of crashes affected:	Drinking and/or Drug Involved crashes
Locations for use:	Known problem areas or during large events
Estimated Safety Benefit:	Unavailable
Estimated Cost Tier:	Moderate

Intersection Related (signalized, stop controlled)

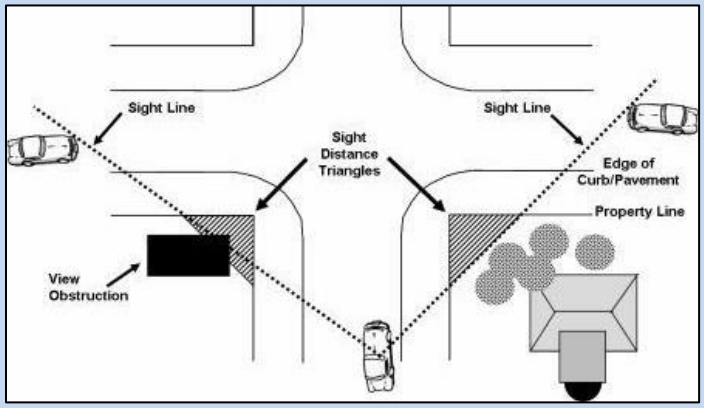
Advanced Intersection Signage	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	The installation of new or supplemental intersection warning and/or lane use signs provide additional warning to the driver that they are approaching an intersection. This provides them with additional time to take appropriate actions to adjust speed, change lanes, scan for traffic or pedestrians, etc.  **Source: FHWA**
Types of crashes affected:	Angle, Rear End, Head On Left Turn
Locations for use:	High risk/crash intersections or those with a higher proportions of improper lane use, turn, and signal violations.
Estimated Safety Benefit:	Advanced Street Name Sign: 1.6 percent reduction in all crash types of all severities Stop Ahead Pavement Markings: 31 percent reduction in all crash types of all severities
Estimated Cost Tier:	Minimal – Low

Improve Traffic Control Visibility	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	Improve the visibility and conspicuity of traffic control devices through the appropriate use of retroreflective posts, LED signs, warning sign installations, signal head backplates, etc.  **Source: cts.umn.edu**
Types of crashes affected:	Angle, Rear End, Head-on Left Turn
Locations for use:	Intersection of all traffic control types and around or along vertical and horizontal curves.
Estimated Safety Benefit:	Various
Estimated Cost Tier:	Low – Moderate

Installation of Transverse Rumble Strips	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	Installation of rumble strips across the travel lanes on approaches to stop controlled intersections.  **Source: FHWA**
Types of crashes affected:	Angle, Rear End, Head-on Left Turn
Locations for use:	Stop controlled intersections with higher risk/crash history and/or higher traffic control violation rates.
Estimated Safety Benefit:	20 percent reduction in all crash types of all severities in rural areas
Estimated Cost Tier:	Low – Moderate

Review and Improve Intersection Lighting	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	For various reasons, intersection may not have lighting or existing lighting may be insufficient. A review of problematic intersections could help identify locations in need of improvement. This could include intersections without existing lighting, locations when damaged lighting has reduced or eliminated actual light, or locations where lighting exists but is not properly positioned to highlight crucial areas.  **Source: FHWA**
Types of crashes affected:	Dark, Unlit Crashes
Locations for use:	Intersections
Estimated Safety Benefit:	38 percent reduction in nighttime serious and minor injury crashes at intersections
Estimated Cost Tier:	Moderate

Review Intersection Traffic Control	
4-"E" Area of Focus:	Engineering Education
Countermeasure Definition:	Intersection traffic control type should be reviewed to determine whether or not it is warranted and whether a more appropriate option could be employed. Additional steps could be taken to help educate the public regarding any new traffic control methods or provide information regarding appropriate navigation and right of way issues associated with existing traffic control.  **Source: FHWA**
Types of crashes affected:	Angle, Rear End, Head On Left Turn
Locations for use:	High risk/crash intersections or those with a higher proportions of traffic control violations.
Estimated Safety Benefit:	N/A – Benefit depends heavily on specific existing conditions and proposed reconfiguration
Estimated Cost Tier:	Moderate – Very High

Sight Distance Clearance & Maintenance	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	Removal of vegetation and other obstructions which restrict the road users' field of vision.  **Source: Edinburg Unified Development Code**
Types of crashes affected:	Angle, Rear End, Head-on Left Turn
Locations for use:	Intersection of all traffic control types and around or along vertical and horizontal curves.
Estimated Safety Benefit:	56 percent reduction in all fatal crash types 48 percent reduction in all serious and minor injury crash types
Estimated Cost Tier:	Low – Moderate

Non-Motorized (pedestrians, bicyclists, carriages)

Crosswalk Improvements	
4-"E" Area of Focus:	Engineering Education
Countermeasure Definition:	Installation of a range of crosswalk improvements would improve the conspicuity of the crosswalk, better alerting drivers of the potential for cross traffic. Some examples include marked & signed crosswalks, improved lighting, pedestrian countdown timers and push buttons, flashing beacons, etc. Additional and supplemental education information could be distributed to help improve pedestrian and other non-motorized use of crosswalks and associated features.  **Source: FHWA**
Types of crashes affected:	Vulnerable/Non-motorized Crashes
Locations for use:	Intersections and midblock crossings
Estimated Safety Benefit:	29 percent reduction in crashes of all types and severities in urban or suburban areas 37 to 69 percent reduction in pedestrian involved crashes in urban or suburban areas
Estimated Cost Tier:	Minimal – Moderate

Improve Sidewalk/Multi-use Trail Interconnectivity & Maintenance	
4-"E" Area of Focus:	Engineering Education
Countermeasure Definition:	Expanding on the existing sidewalk and multi-use trails would provide pedestrians and bicyclists with a safer area to travel and help to separate them from motor vehicle traffic. Implementing or improving on existing maintenance programs would help to ensure that the sidewalks and trails remain a viable route for pedestrians and bicyclists.  **Source: FHWA**
Types of crashes affected:	Vulnerable/Non-Motorized Crashes
Locations for use:	Gaps in sidewalk and trail connectivity as well as higher pedestrian and bicycle volume areas or where increased demand is expected.
Estimated Safety Benefit:	N/A
Estimated Cost Tier:	Low – High

Education & Awareness Programs	
4-"E" Area of Focus:	Education
Countermeasure Definition:	Education programs geared towards pedestrians and bicyclist regarding proper navigation of the trail and road network should prove beneficial in reducing the number of vehicular and non-motorized conflicts. This may be especially helpful for younger children who may not know the proper way to cross the street or how to behave around traffic. Additionally, education regarding bicycle and vehicle interactions is crucial to improve the way drivers and bicycles share the road and respond to each other's presence.
Types of crashes affected:	Bicycle & Pedestrian Involved Crashes
Locations for use:	N/A
Estimated Safety Benefit:	Unavailable
Estimated Cost Tier:	Low – High

Review Lighting Need & Coverage	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	Non-motorized road users, by their nature, are more vulnerable when sharing the road with other vehicles. This can be especially true when traversing the network after dark. Pedestrians often lack any lights or reflective clothing and while some bicyclists have reflective panels on their bikes their size, reflectivity, and condition may vary widely. It is important to ensure that roads and other paths used by vulnerable road users are well lit and delineated. This improves navigation for the vulnerable road users as well as helps them stand out more when sharing the network with vehicles.
Types of crashes affected:	Dark, Unlit Pedestrian & Bicycle Crashes
Locations for use:	N/A
Estimated Safety Benefit:	60 to 70 percent reduction in nighttime serious and minor injury pedestrian and bicycle related crashes
Estimated Cost Tier:	Moderate

Single Vehicle Crashes (run-off-road crashes)

Advanced Curve Warning Signs and/or Chevrons	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	Advanced curve warning signs provide drivers with additional time to adjust their speed to prepare for the upcoming curve. These "Curve Ahead" warning signs may be supplemented with advisory warning speeds where warranted based on the geometry of the curve. Additionally, target arrows and chevron signs help to delineate the path of the curve improving the driver's ability to stay in their lane and on the road. Flashing beacons may be added to the signs to improve their conspicuity and draw drivers' attention to the curve.  **Source: FHWA**
Types of crashes affected:	Single Vehicle Lane Departure, Sideswipe Opposite, Head On
Locations for use:	In advance of and along unmarked or higher risk curves, particularly sharper curves or compound vertical and horizontal curves.
Estimated Safety Benefit:	4 to 52 percent reduction for crashes of all types and severities 28 to 55.5 percent reduction in run off road crashes of all severities
Estimated Cost Tier:	Minimal

Improve Delineation	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	Improving the delineation visibility on stretches of dark or unlit roadway improves the tracking ability of drivers. This can be done through the installation of overhead lighting, improved pavement marking retroreflectiviy, or other reflective equipment along the roadside. These treatments help to illuminate the road itself or improve the delineation of the roadside.  **Source: FHWA**
Types of crashes affected:	Single Vehicle Lane Departure
Locations for use:	Road segments experiencing high concentrations of run off road crashes.
Estimated Safety Benefit:	Lighting Installation: 46 to 54 percent reduction in serious and minor injury nighttime crashes Improved Pavement Markings: N/A – the predicted reduction is a function of the change in retroreflectivity Install Raised Pavement Markers: 13 to 19 percent reduction in all crash types of all severity
Estimated Cost Tier:	Minimal – Low

Install Center & Edgeline Rumble Strips	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	Center and edgeline rumble strips provide the driver with an auditory and tactile alert when they begin to move out of their lane. These strips can be pressed into newly laid pavement or milled in after the fact. They are especially effective when drowsy or distracted drivers are concerned.  **Source: FHWA**
Types of crashes affected:	Single Vehicle Lane Departure, Head On, Sideswipe Same Direction
Locations for use:	Road segments experiencing high concentrations of run off road or head on crashes.
Estimated Safety Benefit:	Centerline: 21 percent reduction in head on and sideswipe crashes of all severities Edgeline: 5 to 18 percent reduction in fatal and serious injury crashes of all types
Estimated Cost Tier:	Low – Moderate

Install/Expand Paved Shoulders	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	Gravel and paved shoulders provide drivers with additional room for correction and vehicle recovery, with paved shoulders being more stable and providing improved traction and control. While paved shoulders are preferred, the installation and maintenance of, at a minimum, gravel shoulders should be considered on roads currently lacking this feature. This extra pavement area improves the driver's ability to correct after leaving their lane but before departing from the road itself.  **Source: FHWA**
Types of crashes affected:	Single Vehicle Lane Departure
Locations for use:	Road segments with little to no paved shoulder. Especially areas with high concentrations of run off road crashes or significant non-motorized volumes sharing the road with vehicles.
Estimated Safety Benefit:	16 to 60 percent reduction in crashes of all types and severities 2 to 18 percent reduction in serious and minor injury fixed object, head on, run off road, and sideswipe crashes
Estimated Cost Tier:	Moderate

Install Safety Edge Pavement Treatments	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	Installation of safety edges (a 30 degree slope) along the edge of paved shoulders improves the ability of drivers to safely return to the roadway when correcting for a roadway departure event.  **Source: FHWA**
Types of crashes affected:	Single Vehicle Lane Departure
Locations for use:	Road segments experiencing high concentrations of run off road crashes.
Estimated Safety Benefit:	7.7 to 15.5 percent reduction in all crash types of all severities 4.7 to 14 percent reduction in run off road crashes of all severities
Estimated Cost Tier:	Minimal – Low

Targeted High Friction Surface Treatments	
4-"E" Area of Focus:	Engineering
Countermeasure Definition:	Targeted high friction surface treatments have been shown to improve surface friction which improves stopping, traction, and lane keeping under a number of different environmental conditions.
Types of crashes affected:	Run off Road, Rear End, Sideswipe, Head-on
Locations for use:	N/A
Estimated Safety Benefit:	40 percent reduction in all crashes of all types
Estimated Cost Tier:	Moderate

Appendix B – Top Local Road Locations by Emphasis Area

At-risk driver age groups (ages 15-to-24 and 65-and-older)

Location Type	Road(s)	Extent	5-year K & A
Int	Division St & Evergreen Dr	-	2
Int	Horton Rd & Hodges Hwy	-	2
Seg	Bacon Rd	Lake Wilson Rd to Spring St	2
Seg	Hillsdale Rd	Bear Lake Rd to Card Rd	2
Seg	State Rd	Milnes Rd to Lake Pleasant Rd	2
Seg	Moscow Rd	Folks Rd to Buckman Rd	2
Seg	Hanover Rd	Moscow Rd to Reynolds Rd	2
Seg	Robinson Rd	Spring Arbor Rd to Dresden Dr	2
Seg	Sand Creek Hwy	Packard Rd to Weston Rd	2
Seg	Britton Hwy	County Border to Clinton Macon Rd	2

Driver Behavior (Speeding, Distracted, Drowsy, Etc.)

Location Type	Road(s)	Extent	5-year K & A
Int	State Rd & Lake Pleasant Rd	-	2
Int	Wisner St & Morrell St	-	2
Int	Wildwood Ave & Edward Ave	-	2
Int	Lansing ave & Blackstone St	-	2
Int	Trail St & Blackstone St	-	3
Int	Division St & Evergreen Dr	-	2
Int	Horton Rd & Hodges Hwy	-	2
Int	Occidental Hwy & Valley Rd	-	3
Seg	Valley Rd	Black Hwy to Occidental Hwy	3
Seg	State Rd	Milnes Rd to Lake Pleasant Rd	3
Seg	Michigan Ave	Chapel Rd to Dearing Rd	3
Seg	Robinson Rd	Spring Arbor Rd to Dresden Dr	3
Seg	Wisner St	Monroe St to Argyle St	3
Seg	Wolf Lake Rd	Page Ave to Burgett Ln	3

Impaired Drivers

Location Type	Road(s)	Extent	5-year K&A
Seg	Dearing Rd	Michigan Ave to McCain Rd	2
Seg	Page Ave	Russell St to Ann St	2
Seg	Wolf Lake Rd	Page Ave to Burgett Ln	2
Seg	Rollin Hwy	Addison Rd to Manitou Beach Rd	2
Seg	Sand Creek Hwy	Packard Rd to Weston Rd	2
Int	Crawford Rd & Long Lake Rd	-	1
Int	Springport Rd & Risner Ln	-	1
Int	Folks Rd & Thorne Rd	-	1
Int	Hanover Rd & Skyline Dr	-	1
Int	Coon Hill Rd & Reno Dr	-	1
Int	Stony Lake Rd & Benton Rd	-	1
Int	Clinton Macon Rd & Sutfin Hwy	-	1
Int	Occidental Hwy & Valley Rd	-	1

Intersection Related (signalized, stop controlled)

Location Type	Road(s)	5-year K & A
Int	State Rd & Lake Pleasant Rd	2
Int	Dearing Rd & McCain Rd	2
Int	Morrell St & Wisner St	2
Int	Horton Rd & Hodges Hwy	2
Int	Crawford Rd & Long Lake Rd	1
Int	Cranberry Lake Rd & Litchfield Rd	1
Int	Jackson St & Prospect St	1
Int	Benton Rd & Stony Lake Rd	1
Int	Rollin Hwy & Rome Rd	1
Int	Hawkins Hwy & Shepherd Rd	1
Int	Weston Rd & Terry Hwy	1
Int	Lyons Hwy & Weston Rd	1
Int	Sand Creek Hwy & Cadmus Rd	1
Int	Church St & Ann St	1
Int	Ogden Hwy & Deerfield Rd	1

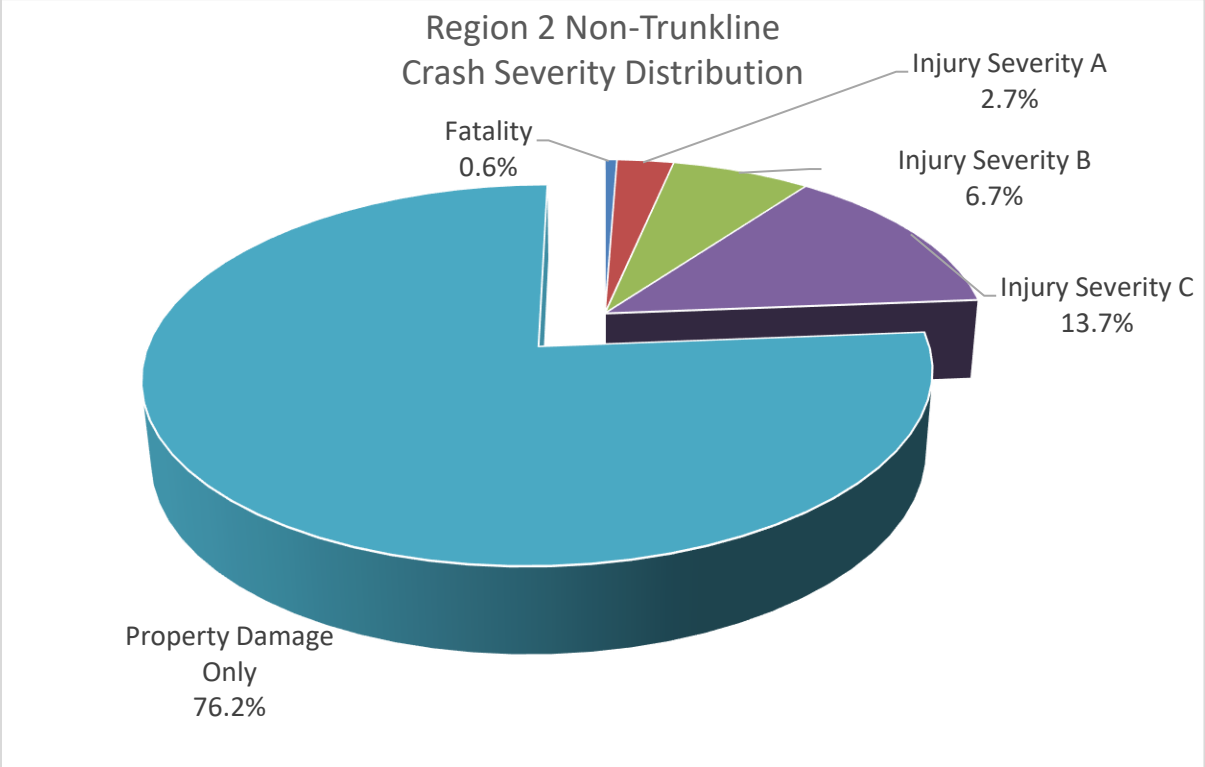
Non-Motorized (pedestrians, bicyclists, carriages)

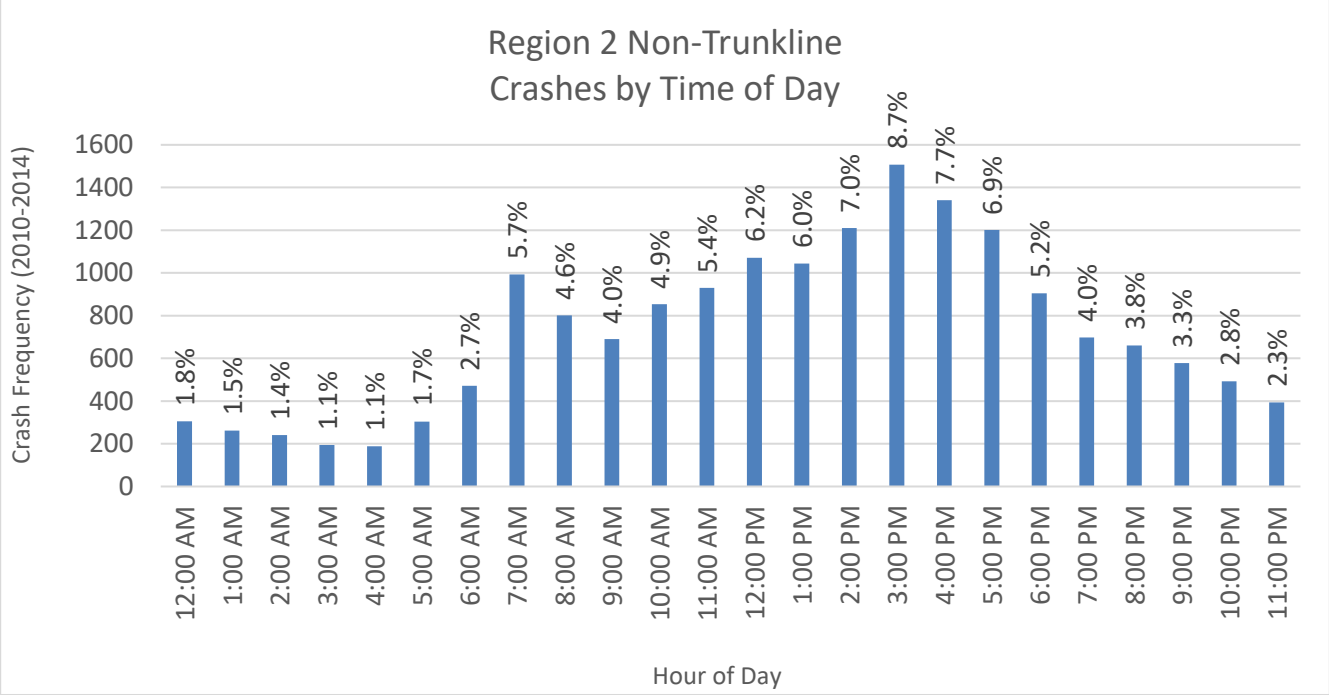
Location Type	Road(s)	Extent	5-year K & A
Seg	Montgomery Rd	East of Gilmore Rd	1
Seg	Hillsdale Rd	Reading Rd to Reynolds Rd	1
Seg	Homer Rd	Maumee St to Blackmer Dr	1
Seg	Knowles Rd	Sterling Rd to Addison Rd	1
Seg	Brown Rd	Clinton Rd to Sibley Rd	1
Seg	Michigan Ave	West Court St to I-94 Interchange	2
Seg	Sears Rd	Bowerman Rd to Moscow Rd	1
Seg	Wisner St	Monroe St to Argyle St	1
Seg	Brown St	Michigan Ave to Wildwood Ave	1
Seg	Main St	Slee Rd to Wimple Rd	1
Int	Church St & Ann St	-	1
Seg	Sutton Rd	Raisin Center Hwy to Oakridge Dr	1
Int	Edward Ave & Wildwood Ave	-	2

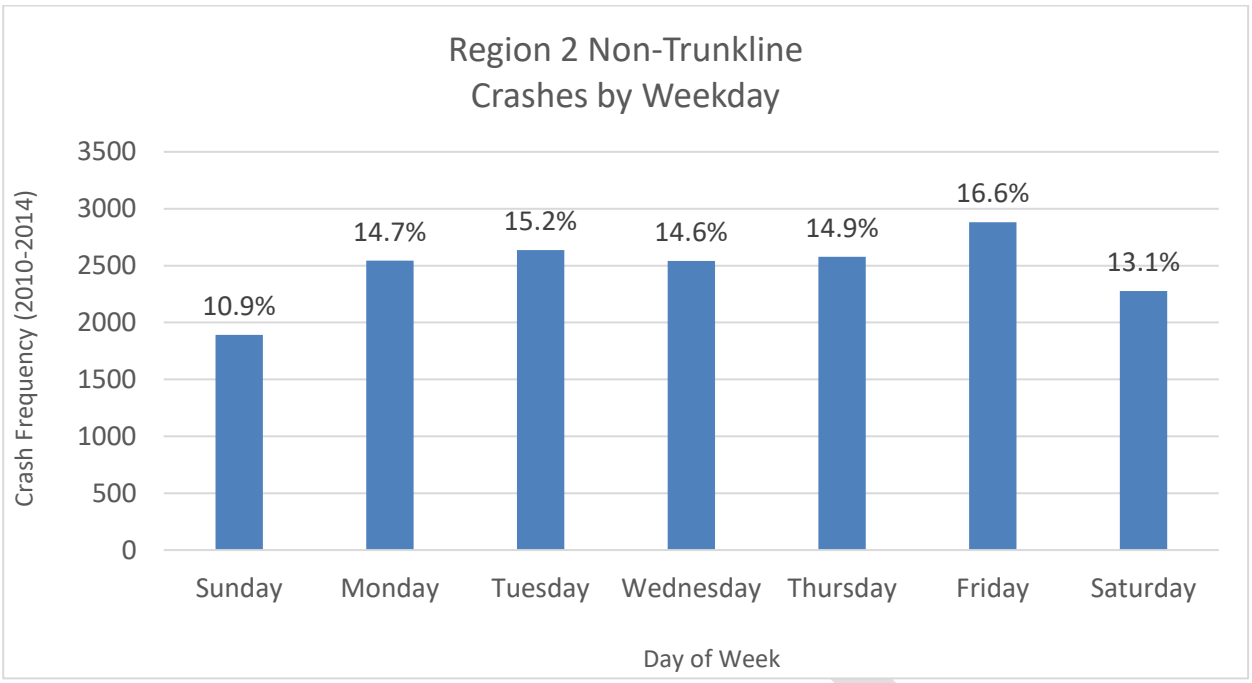
Single Vehicle Crashes (run-off-road crashes)

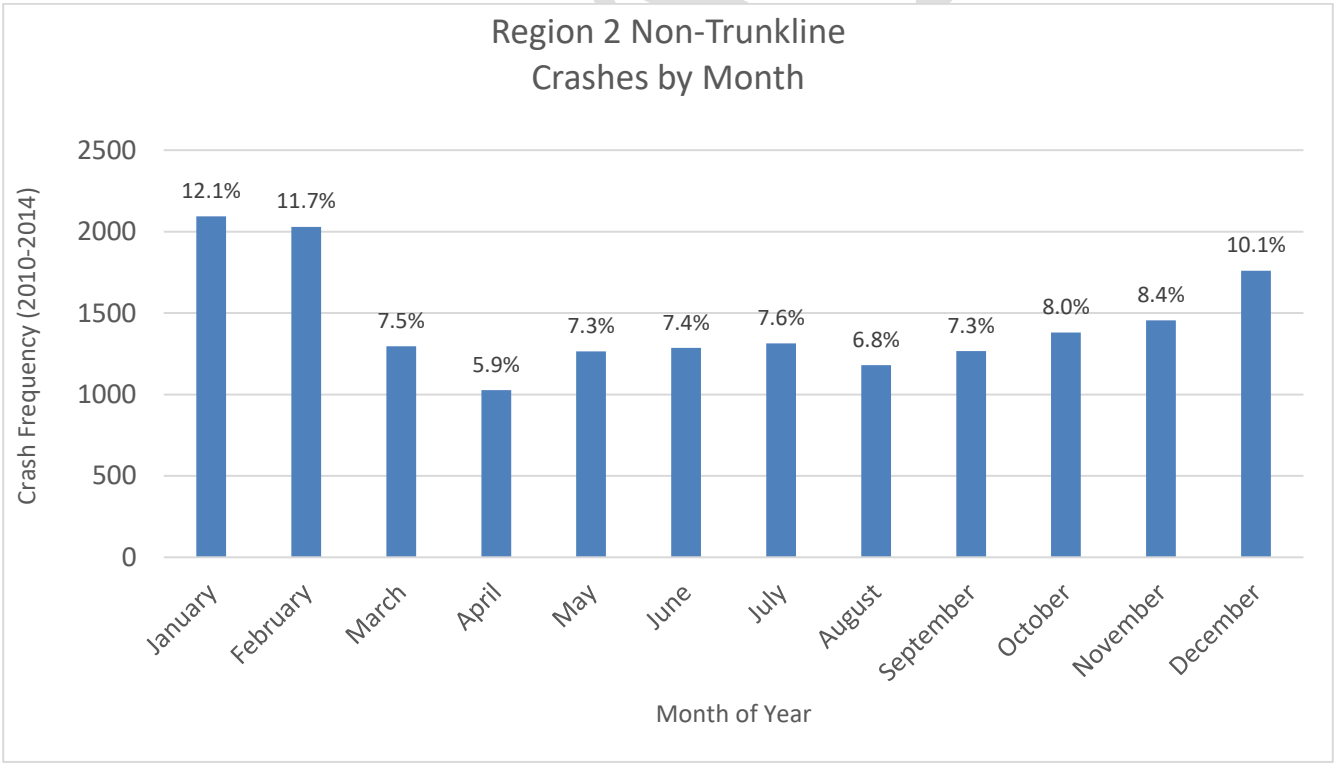
Location Type	Road(s)	Extent	5-year K & A
Seg	Hillsdale Rd	Bear Lake Rd to Card Rd	2
Seg	Adams Rd	West of Lake Pleasant Rd	2
Seg	Bowerman Rd	Cochran Rd to Tripp Rd	2
Seg	Chapel Rd	Michigan Ave to Idaho Ln	2
Seg	Michigan Ave	Chapel Rd to Dearing Rd	2
Seg	Dearing Rd	Michigan Ave to McCain Rd	2
Seg	Page Ave	Russell St to Ann St	2
Seg	Wolf Lake Rd	Page Ave to Burgett Ln	2
Seg	Valley Rd	Black Hwy to Occidental Hwy	2
Seg	Stearns Hwy	Kingsbury Rd to Deerfield Rd	2

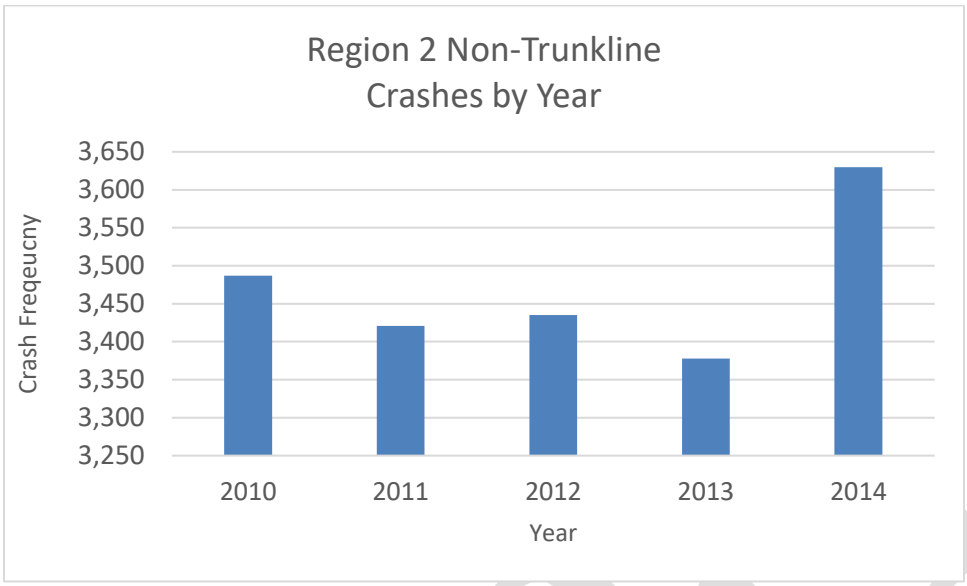
Appendix C – Region 2 Non-Trunkline Data Analysis (2010-2014)

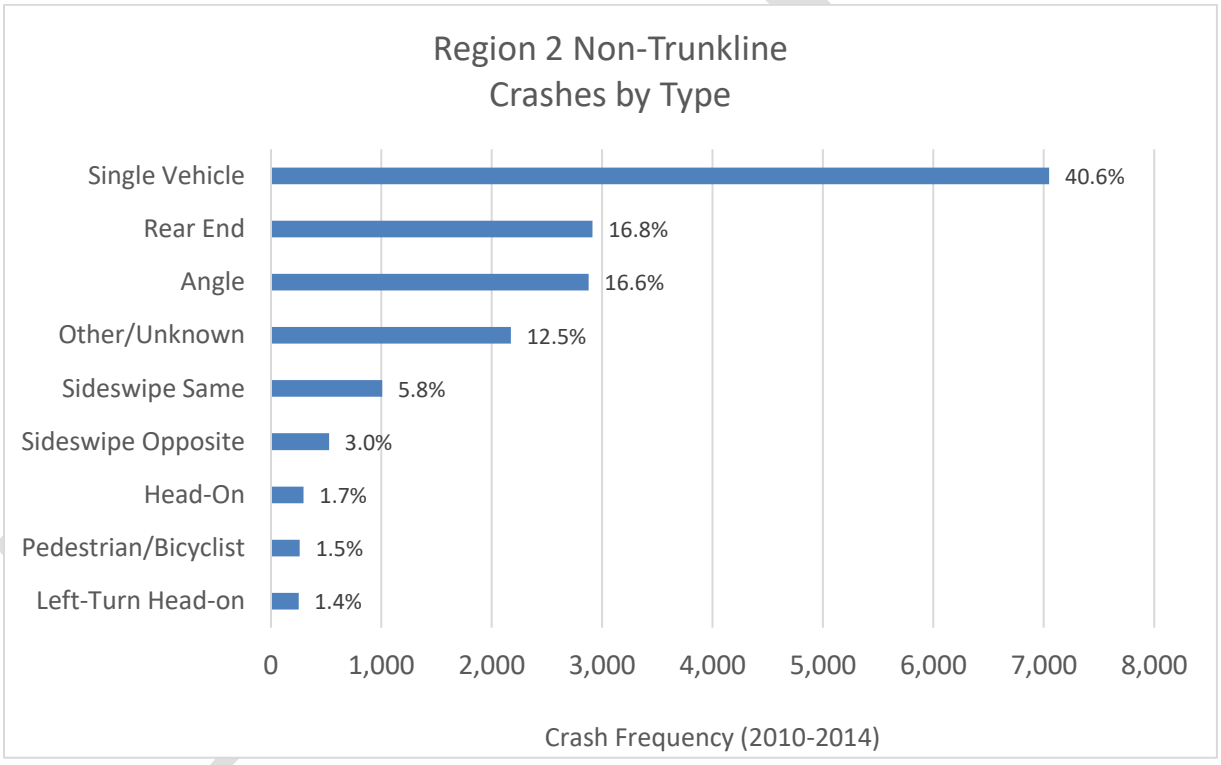


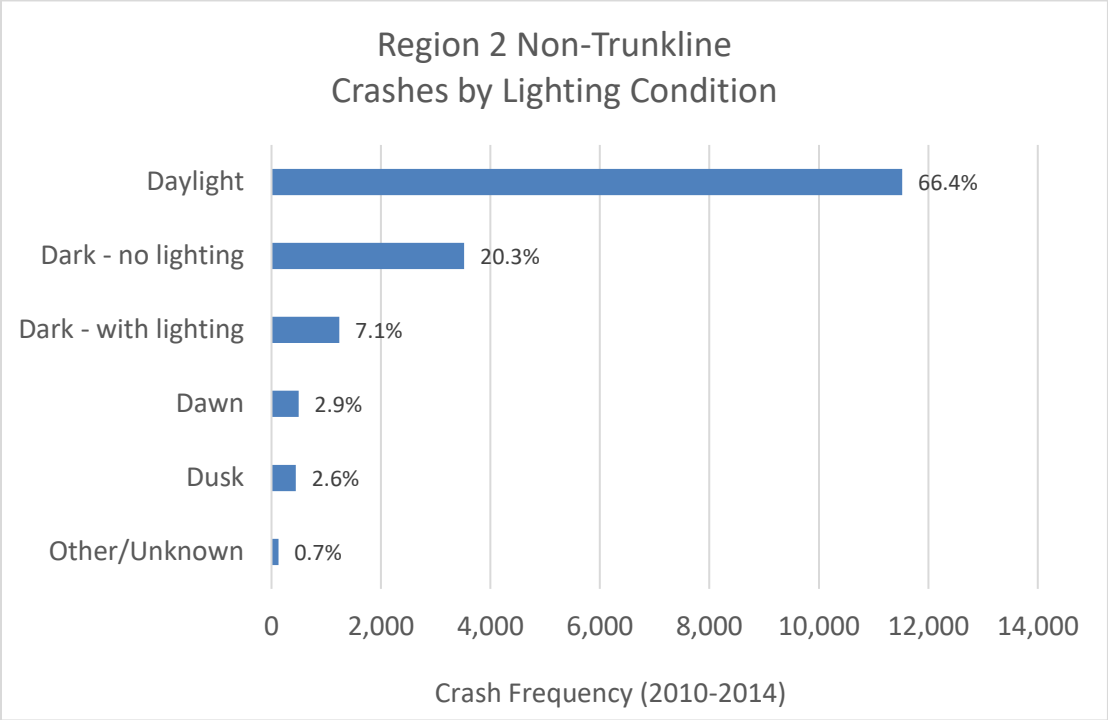


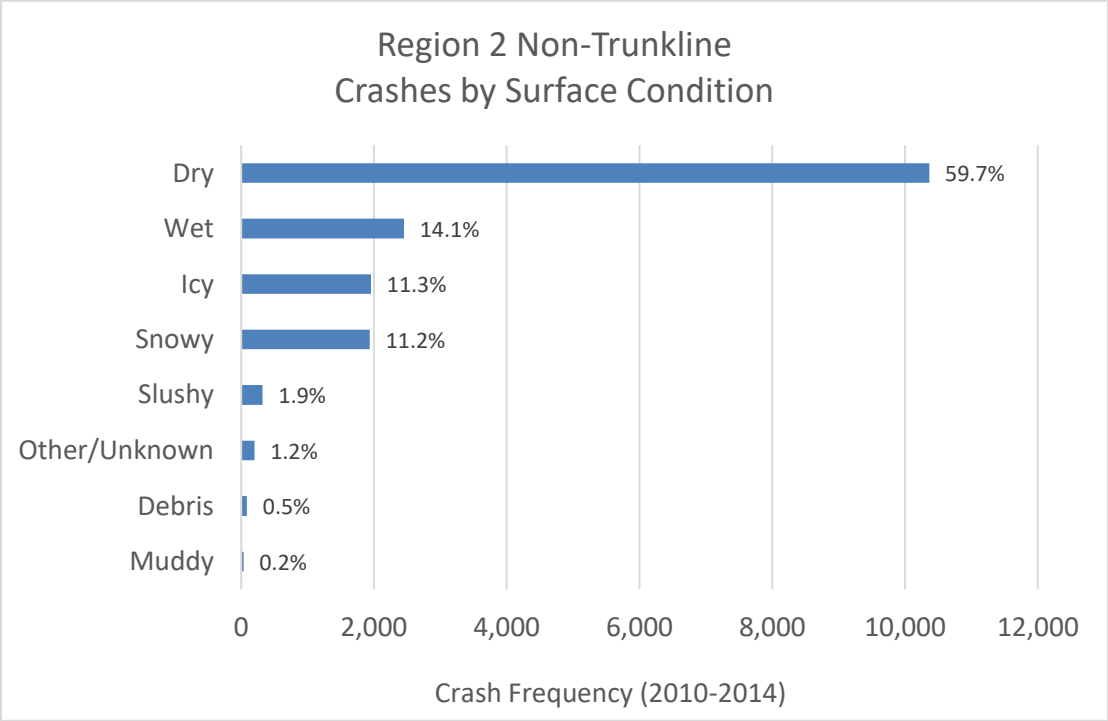

Region 2 Non-Trunkline
Crashes by Weekday
Crash Frequency (2010-2014)
3500
3000
2500
2000
1500
1000
500
0
10.9%
14.7%
15.2%
14.6%
14.9%
16.6%
13.1%
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Day of Week

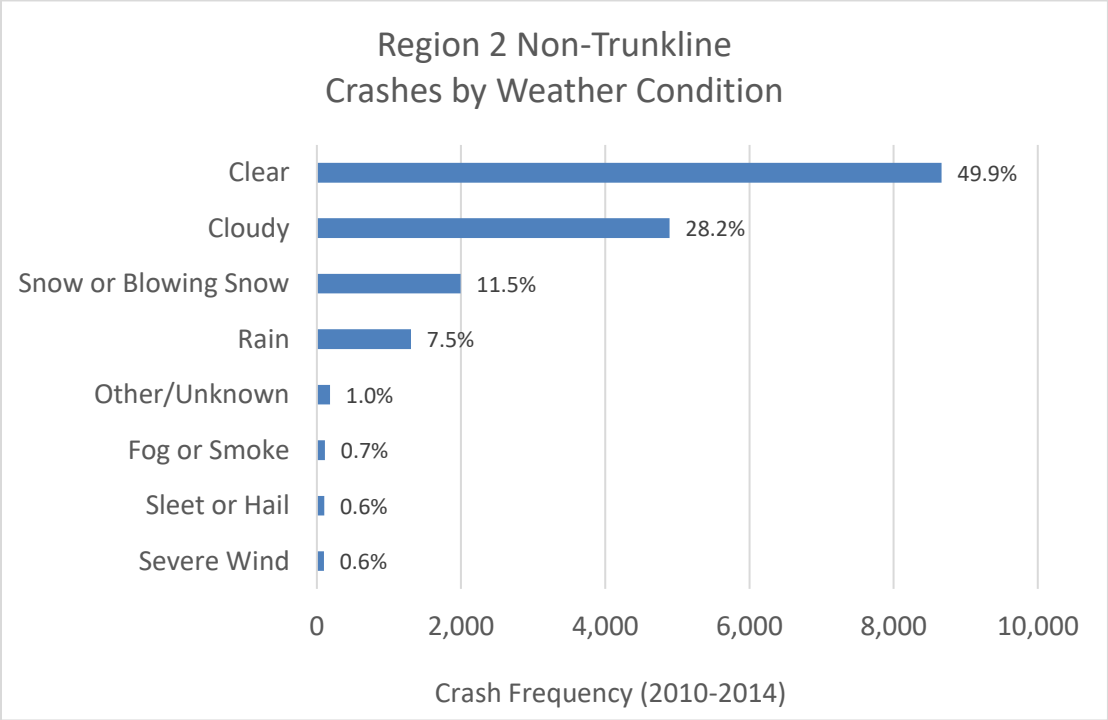

Region 2 Non-Trunkline
Crashes by Month
Crash Frequency (2010-2014)
2500
2000
1500
1000
500
0
12.1%
11.7%
7.5%
5.9%
7.3%
7.4%
7.6%
6.8%
7.3%
8.0%
8.4%
10.1%
January
February
March
April
May
June
July
August
September
October
November
December
Month of Year


Region 2 Non-Trunkline
Crashes by Year
Crash Freqeucny
3,650
3,600
3,550
3,500
3,450
3,400
3,350
3,300
3,250
2010
2011
2012
2013
2014
Year


Region 2 Non-Trunkline
Crashes by Type
Single Vehicle
Rear End
Angle
Other/Unknown
Sideswipe Same
Sideswipe Opposite
Head-On
Pedestrian/Bicyclist
Left-Turn Head-on
40.6%
16.8%
16.6%
12.5%
5.8%
3.0%
1.7%
1.5%
1.4%
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
Crash Frequency (2010-2014)


Region 2 Non-Trunkline
Crashes by Lighting Condition
Daylight
66.4%
Dark - no lighting
20.3%
Dark - with lighting
7.1%
Dawn
2.9%
Dusk
2.6%
Other/Unknown
0.7%
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
Crash Frequency (2010-2014)

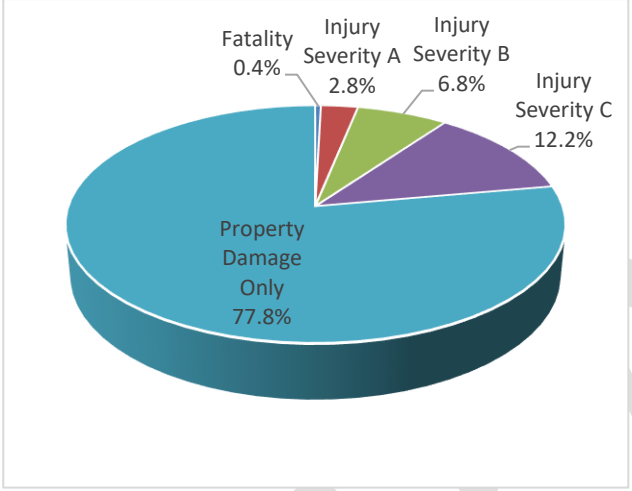

Region 2 Non-Trunkline
Crashes by Surface Condition
Dry
59.7%
Wet
14.1%
Icy
11.3%
Snowy
11.2%
Slushy
1.9%
Other/Unknown
1.2%
Debris
0.5%
Muddy
0.2%
0
2,000
4,000
6,000
8,000
10,000
12,000
Crash Frequency (2010-2014)


Region 2 Non-Trunkline
Crashes by Weather Condition
Clear
Cloudy
Snow or Blowing Snow
Rain
Other/Unknown
Fog or Smoke
Sleet or Hail
Severe Wind
49.9%
28.2%
11.5%
7.5%
1.0%
0.7%
0.6%
0.6%
0
2,000
4,000
6,000
8,000
10,000
Crash Frequency (2010-2014)

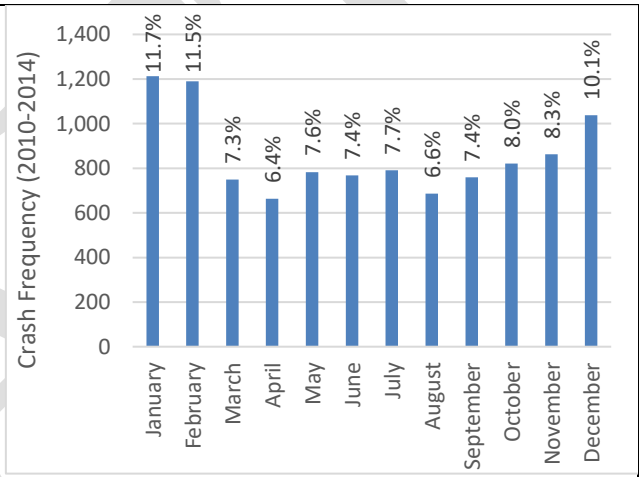
Appendix D – Non-Trunkline County Summaries (2010-2014)

Jackson County Summary

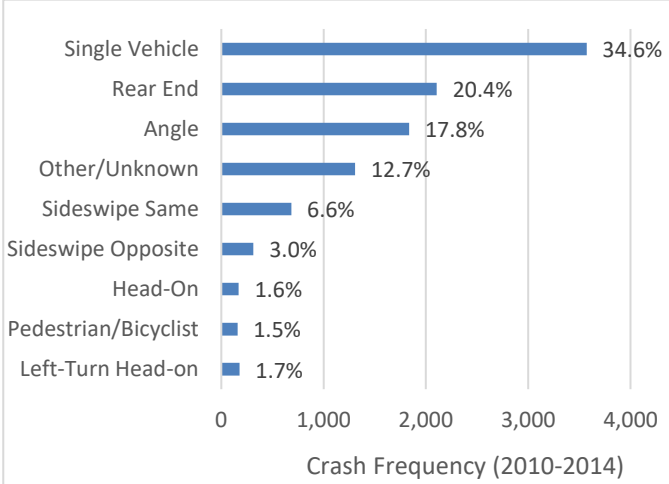
Jackson County experienced more than half (10,324 of 17,351) of the crashes reported on Region 2 Non-Trunkline roads during the analysis period. The summary statistics provided here mirror those for the region as a whole fairly closely. However, this county experienced a greater proportion of rear end, angle, and sideswipe same type crashes when compared to the region as a whole. The following figures would suggest that crashes in this county peak during the winter months, as supported by the monthly distribution and the significant portion occurring under icy, wet, or snowy road conditions. Additionally, single vehicle, rear end, and angle crashes account for roughly 73 percent of all crashes in the county on non-trunkline roads.



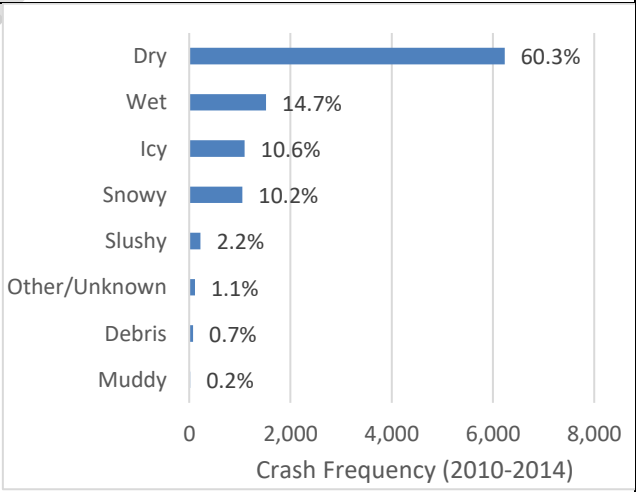
Jackson County Crash Severity Distribution



Jackson County Monthly Crash Distribution



Jackson County Crash Type Distribution

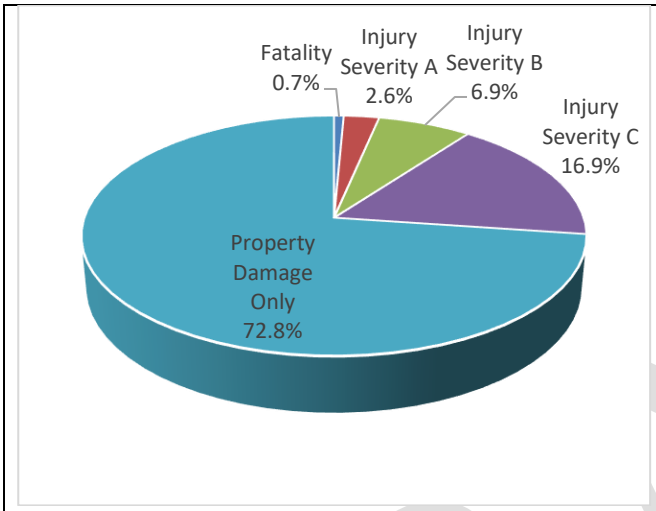


Jackson County Road Condition Distribution

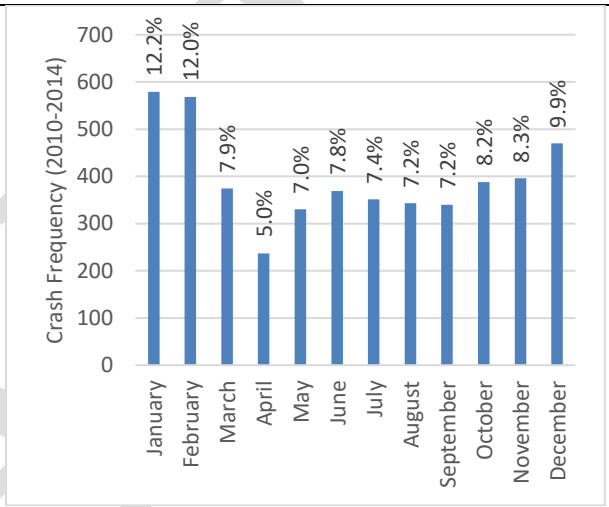
Location Type	Road(s)	Extent	5-year K & A
Int	Trail St & Blackstone St	-	3
Int	McCain Rd & Dearing Rd	-	2
Int	Morrell St & Wisner St	-	2
Int	Wesley St & Jackson St	-	2
Int	Lansing ave & Blackstone St	-	2
Seg	W Michigan Ave	Chapel Rd to Dearing Rd	3
Seg	Hanover Rd	Moscow Rd to Reynolds Rd	3
Seg	Robinson Rd	Spring Arbor Rd to Dresden Dr	3
Seg	Wisner St	Monroe St to Argyle St	3
Seg	Wolf Lake Rd	Page Ave to Burgett Ln	3
Seg	Concord Rd	I-94 Interchange to Erie Rd	2
Seg	Michigan Ave	West Court St to I-94 Interchange	2
Seg	Michigan Ave	Hendershot Rd to Harrington Rd	2
Seg	Chapel Rd	Michigan Ave to Idaho Ln	2
Seg	Dearing Rd	Maci Blvd to I-94 Interchange	2
Seg	Michigan Ave	Dearing Rd to Sandstone Rd	2
Seg	Dearing Rd	Michigan Ave to McCain Rd	2
Seg	Bowerman Rd	Cochran Rd to Tripp Rd	2
Seg	Moscow Rd	Folks Rd to Buckman Rd	2
Seg	Bohne Rd	Kalmbach Rd to Sager Rd	2

Lenawee County Summary

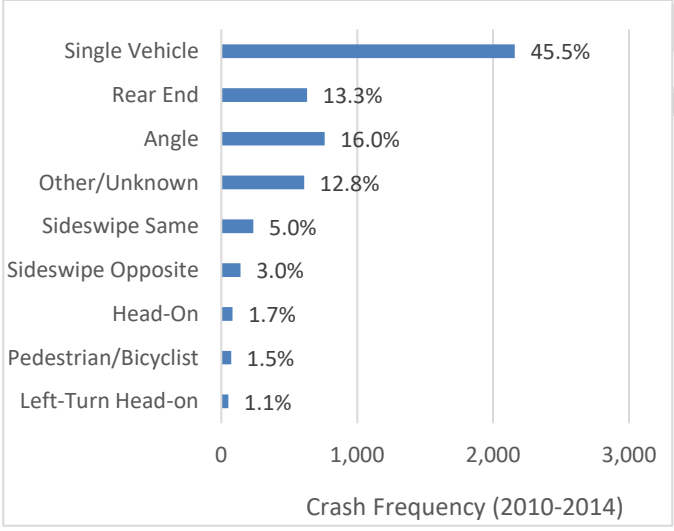
Lenawee County experienced approximately a quarter (4,745 of 17,351) of the crashes reported on Region 2 Non-Trunkline roads during the analysis period. The summary statistics provided here mirror those for the region as a whole fairly closely, with a greater emphasis on single vehicle crashes and injury type crashes. The following figures would suggest that crashes in this county also peak during the winter months, as supported by the monthly distribution and the significant portion occurring under icy, wet, or snowy road conditions. Additionally, single vehicle, rear end, and angle crashes account for nearly 75 percent of all crashes in the county with approximately 45 percent being single vehicle crashes.



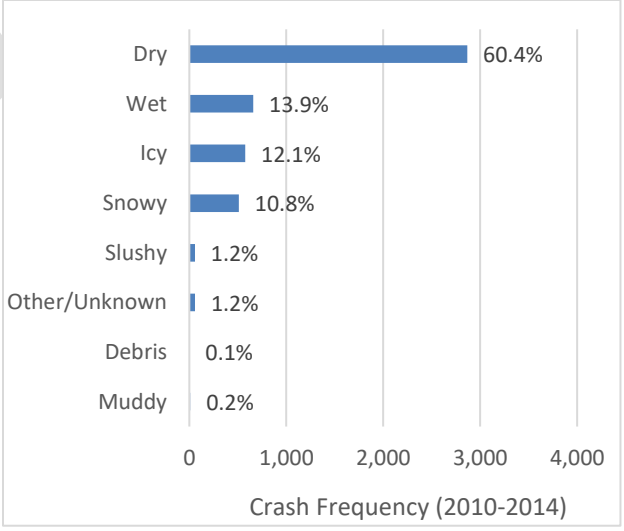
Lenawee County Crash Severity Distribution



Lenawee County Monthly Crash Distribution



Lenawee County Crash Type Distribution

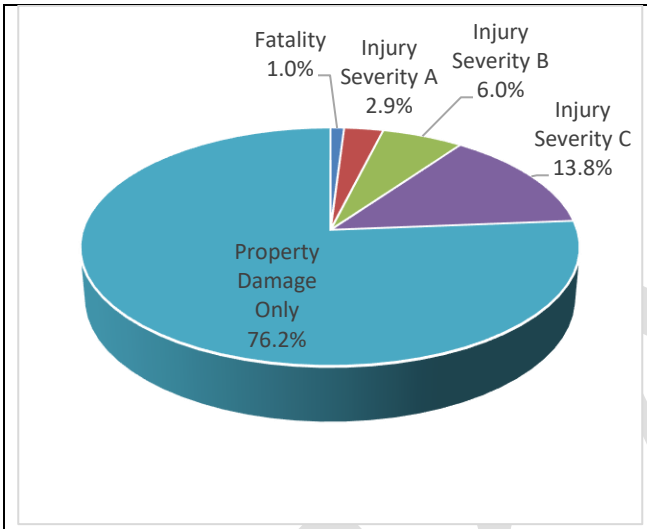


Lenawee County Road Condition Distribution

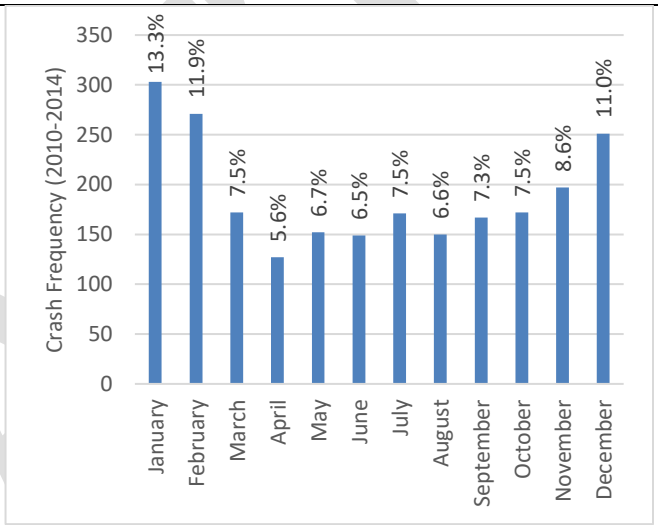
Location Type	Road(s)	Extent	5-year K & A
Int	Occidental Hwy & Valley Rd	-	3
Int	Division St & Evergreen Dr	-	2
Int	Horton Rd & Hodges Hwy	-	2
Seg	Rollin Hwy	Addison Rd to Manitou Beach Rd	2
Seg	Morenci Rd	Munson Hwy to Myerholts Hwy	2
Seg	Munson Hwy	Lawrence St to County Border	2
Seg	Sand Creek Hwy	Packard Rd to Summit St	2
Seg	Valley Rd	Black Hwy to Occidental Hwy	3
Seg	Deerfield Rd	Parr Hwy to Ogden Hwy	2
Seg	Horton Rd	East of Hodges Hwy	2
Seg	Rogers Hwy	South of Deerfield Rd	2
Seg	Silberhorn Hwy	Horton Rd to Mason Rd	2
Seg	Ridge Hwy	Miles Macon Hwy to Smith Rd	2
Seg	Clinton Macon Rd	Britton Hwy to Teufel Hwy	2
Seg	Britton Hwy	County Border to Clinton Macon Rd	2
Seg	Ridge Hwy	Pennington Rd to Mohart Hwy	2
Seg	Stearns Hwy	Kingsbury Rd to Deerfield Rd	2
Seg	Rodesiler Hwy	River St to Lulu Rd	2

Hillsdale County Summary

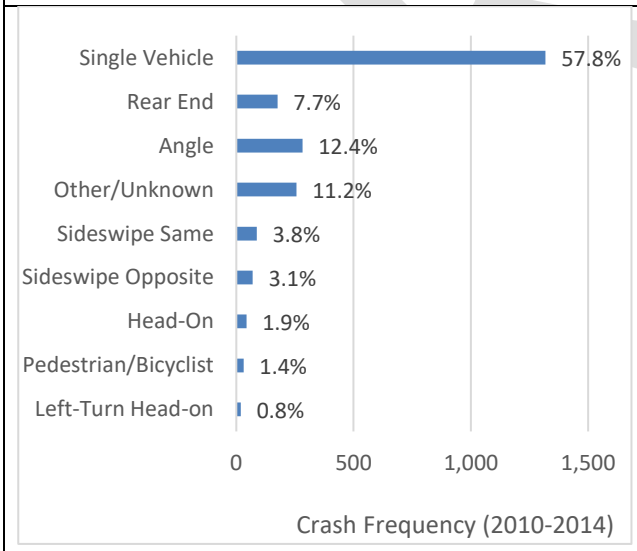
Hillsdale County experienced approximately thirteen percent of the crashes (2,282 of 17,351) reported on Region 2 Non-Trunkline roads during the analysis period. The summary statistics provided here also mirror those for the region as a whole fairly closely, with a greater emphasis on single vehicle crashes. The following figures would suggest that crashes in this county peak during the winter months, as supported by the monthly distribution and the significant portion occurring under icy, wet, or snowy road conditions. Icy and snowy road crashes were more prevalent in this county when compared to the others. Additionally, rear end, run off road, and angle crashes account for roughly 78 percent of all crashes in the county with single vehicle crashes accounting for more than half of all crashes on non-trunkline roads.



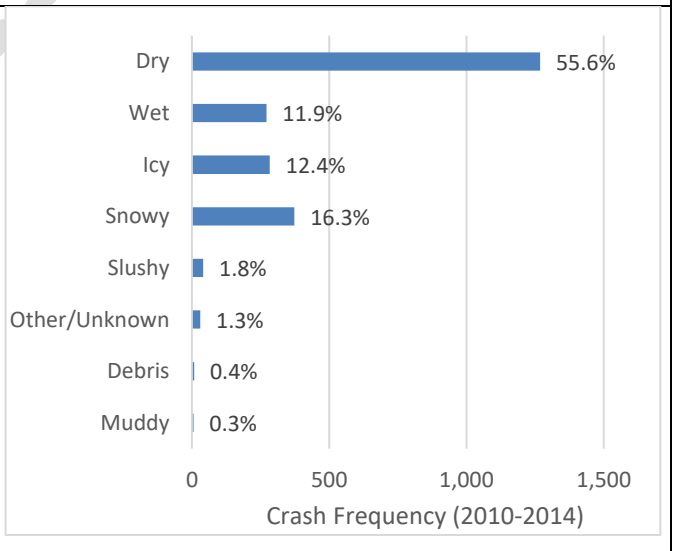
Hillsdale Crash Severity Distribution



Hillsdale County Monthly Crash Distribution



Hillsdale Crash Type Distribution



Hillsdale Road Condition Distribution

Location Type	Road(s)	Extent	5-year K & A
Int	State Rd & N Lake Pleasant Rd	-	2
Seg	Mechanic Rd	Burn Rd to Lake Wilson Rd	3
Seg	State Rd	Airport Rd to Lake Pleasant Rd	3
Seg	S Hillsdale Rd	Bear Lake Rd to Card Rd	3
Seg	W Bacon Rd	Lake Wilson Rd to Spring St	2
Seg	N Adams Rd	Milnes Rd to Lake Pleasant Rd	2
Seg	State Rd	Lake Pleasant Rd to Gi Mosley	2
Seg	E Bacon Rd	Osseo Rd to Tripp Rd	2
Seg	N Adams Rd	Waldron Rd to Wheatland Rd	2

Appendix E – Potential Funding Sources

MDOT Safety Program

The Michigan Department of Transportation Safety Program announces a call for projects on a yearly basis. The program operates on a matched funding basis. For projects addressing safety issues that do not include fatalities or serious injuries, the match is 80 percent federal funds / 20 percent local funds. For safety projects which address concerns related to a fatality or serious injury, the match shifts to 90 percent federal funds / 10 percent local. Projects eligible for funding under this program include all safety related projects which meet current standards, warrants and are compliant with the ADA and Buy American Act, among others. Additionally, the program allows for funding of systemic safety projects with monetary goals for projects such as road safety audits, non-motorized facilities, surfacing treatments and rumble strip and guard rail installations, among others.

Transportation Alternatives Program

The Transportation Alternatives Program (TAP) provides competitive grants to agencies in an effort to support and encourage the development of intermodal transportation systems as an alternative to vehicular traffic. The program is open to a wide range of agencies including county road commissions, cities, villages, and regional transportation authorities. As the Safe Routes to School Program has been brought under the umbrella of the TAP, they cover a similar group of eligible project types. Some projects unique to TAP funding include conversion of abandoned railroad corridors to trails, vegetation management practices in rights of way, and boulevards in the right of way of former divided highways. Applications for funding are accepted year round.

Safe Routes to School Program

The Safe Routes to School Program (SR2S) has three main goals:

- To increase and encourage children of all capabilities to walk and bicycle to school,
- Improve the safety and appeal of walking and biking to school, and;
- To support the planning and implementation of projects and programs to reduce vehicular traffic and emissions in the areas around schools.

The program is currently administered under the Transportation Alternative Program and paired with the Transportation Enhancements and Recreational Trails programs. The program generally includes sidewalk improvements, on-street and off-street bicycle facilities improvements, driver feedback and variable speed limit signs, sidewalk lighting, etc. Additional non-infrastructure projects are included in the list of eligible projects such as walk or bike to school day programs, personal safety education programs and volunteer safety patrols among others.

Highway Safety Improvement Program

The main goal of the Highway Safety Improvement Program mirrors that of the RTSP in that it seeks to help reduce the number of fatalities and serious injuries occurring each year on the transportation network. The program spurred the development of the strategic highway safety plans for the states and helps to provide high level direction and guidance. Funds made available through the HSIP may be used for both infrastructure and non-infrastructure programs. Most projects eligible under the program require a 10 percent local match. Some projects, however, may receive 100 percent federal funding depending on the specific project type. While the High Risk Rural Roads fund has been phased out under MAP-21, there are still measures to direct some funding towards high risk rural roads when certain metrics are exceeded.

Local Matches

Regardless of the project type and funding source, collection of local matches for safety projects and programs provide an additional source of funding. Additionally, inclusion of a source of local matches tend to improve the feasibility or reception of funding applications from other sources. It provides evidence for local support for the project and help to offset other matching or federal costs. Local matches can be coordinated with community groups, local business, or other community partners with a stake in the project area or outcome.

Congestion Mitigation and Air Quality Improvement (CMAQ) Program

While CMAQ funding is designated for projects which help to reduce congestion, delay and other operational characteristics, some safety projects may have a positive impact on these metrics. As such, there may be potential to apply for CMAQ funding on eligible projects in support of other safety funding sources. This could provide the opportunity to obtain CMAQ funding that may be used as matching funds for other applications.

Surface Transportation Improvement Grants (STP)

Funds made available through the STP cover a wide range of potential projects. State and local governments may apply for the funding with portions set aside specifically for metropolitan planning areas with populations of varying levels, including below 200,000 and 50,000 people. Potentially eligible projects include:

- Public transportation capital improvements,
- Car and vanpool projects,
- Fringe and corridor parking facilities,
- Bicycle and pedestrian facilities, and;
- Bus terminals and facilities.

Projects eligible for funding under the STP do not necessarily need to have a safety component. The grants generally require local matches, the amount of which varies depending on the type of project and system the project is occurring on. Generally, a twenty percent matching fund is required.

Metropolitan Planning Program and State Planning and Research Program

A wide range of planning activities may be eligible for funding under either of these programs. Funds are allocated to each state based in part on the state's proportion of urban areas when compared to the nation as a whole. Funds are then distributed by the state to the municipal planning organizations (MPO) based on individual state formulas with each MPO receiving a guaranteed minimum. Projects do not necessarily need to be safety related, although safety related projects are specifically mentioned in the list of eligible project types. Funding may be applied towards planning activities for:

- Developing the economic vitality of the metropolitan area,
- Increasing the safety and security of the transportation system for motorized and non-motorized users,
- Improving the accessibility and mobility of people and freight,
- Protecting and enhance the environment, promote energy conservation,
- Improving the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns,
- Enhancing the integration and connectivity of the transportation system, across and between modes, for people and freight,
- Promoting efficient system management and operation, and;
- Emphasizing the preservation of the existing transportation system.

Transportation Enhancement Activities

This program covers funding for projects that fall under at least one of twelve specific activities. The States solicit and select projects for funding and may disburse said funding to Federal, Tribal, State, or local government agencies. The twelve activities eligible for funding under this program are summarized as follows:

- Providing facilities for non-motorized users,
- Safety and educational activities for non-motorized users,
- Acquisition of scenic or historic easements or sites,
- Acquisition of scenic or historic highway programs,
- Landscaping and beautification,
- Historic preservation,
- Rehabilitation and operation of historic transportation buildings and facilities,
- Preservation of abandoned railway corridors,
- Management of outdoor advertising,
- Archaeological planning and research,
- Environmental mitigations related to transportation activities, and;
- The establishment of transportation museums.

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