WEST MICHIGAN SHORELINE REGIONAL DEVELOPMENT COMMISSION

WEST MICHIGAN METROPOLITAN TRANSPORTATION PLANNING (WESTPLAN)

SAFETY ACTION PLAN

##

ADOPTED APRIL 2024

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WEST MICHIGAN SHORELINE REGIONAL DEVELOPMENT COMMISSION

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WSP
GUARDIAN BUILDING, SUITE 2600
500 GRISWOLD STREET
DETROIT, MI 48226

TEL.: +1 313 963-5760
FAX: +1 313 963-6910
WSP.COM

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Date	11/09/2023	26/09/2023
Prepared by	Patrick Eldridge, P.E.	Patrick Eldridge, P.E.
Checked by	WestPlan MPO Andrew Ceifetz, P.E.	WestPlan MPO Andrew Ceifetz, P.E.
Authorized by	Andrew Ceifetz, P.E.	Andrew Ceifetz, P.E.
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PRODUCTION TEAM

CLIENT

West Michigan Shoreline Regional Development Commission – Project Manager	Joel Fitzpatrick
Michigan Department of Transportation – Project Manager	Carissa McQuiston, P.E.

WSP

Project Manager	Andrew Ceifetz, PE, RSP_2
Project Engineer	Patrick Eldridge, PE, PTOE, RSP_1

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The WestPlan MPO Safety Action Plan developed for the West Michigan Shoreline Regional Development Commission (WMSRDC) was guided by the experience and expertise of local stakeholders, maintaining agencies, and the Safe System Approach (SSA). Special thanks go to the local stakeholders and steering committee members for providing insight and guidance into the concerns and needs of the local communities and vulnerable populations in working toward a more comprehensive and responsive action plan.

Placeholder for Commitment to Zero Fatalities

EXECUTIVE SUMMARY

The primary goal of the WestPlan MPO Safety Action Plan is the reduction of fatal and incapacitating injury crashes within the MPO's transportation network. The process is guided by the Safe System Approach (SSA) and Safe Streets and Roads for All (SS4A) program which emphasizes both a reduction in travel speeds and related kinetic energy involved, as well as bring an additional equity focus to better serve more vulnerable populations. While the plan development was guided by SSA principles, the development process generally followed the approach provided in the Federal Highway Administration (FHWA) guidance document, "Developing Safety Plans: A Manual for Local Rural Road Owners" and includes the following six steps, adjusted as needed to incorporate SSA tenants:

1. Identify Leadership/Safety Advocates
2. Collect and Analyse Safety Data & Public Engagement
3. Determining Emphasis Areas
4. Identifying Treatment Strategies
5. Prioritizing and Incorporate Strategies
6. Evaluate and Update the Safety Plan

This report provides the foundational crash data and preliminary stakeholder engagement used to identify seven Emphasis Areas and their associated treatment strategies. Routine evaluation of the Safety Action Plan should be conducted to ensure current concerns and strategies are represented, and equitable consideration of safety programs and projects is representative of and responsive to the communities it is designed to serve. While the steps in the development process followed the previous FHWA guidance document, the Safety System Approach guided the identification of Emphasis Areas and potential strategies and is focused on the tenants summarized in **Figure 1** below.

Figure 1 - Safe System Approach Tenants (FHWA)

Based on these methodologies, a review of the five most recent years of available crash data (2018 – 2022), and consultation with local stakeholders and maintaining agencies seven Emphasis Areas were identified, which collectively account for nearly 100% of the reported fatal and incapacitating injury crashes. Based on the collective results, treatment strategies have been identified to help address each of the highlighted Emphasis Areas listed below.

- Intersection Sight Distance & Traffic Control
- Lane Departure
- Impaired Driver Involved Crashes
- Driver Behaviour Related
- Motorcycle Involved Crashes
- Vulnerable Road User Involved Crashes
- Wrong-Way Driving

The selected Emphasis Areas and guidance from stakeholders were used to categorize practical treatment strategies for addressing the identified target crashes in both systemic and systematic approaches. Detailed treatment information and information 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
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
EMS	Emergency Management Systems
FHWA	Federal Highway Administration
MDOT	Michigan Department of Transportation
MPO	Metropolitan Planning Organization
MVMT	Million Vehicle Miles Traveled
SAP	Safety Action Plan
SS4A	Safe Streets and Roads for All
SSA	Safe System Approach
SFST	Standard Field Sobriety Testing Program
SR2S	Safe Routes to School Program
Systemic	“A systemic approach to safety involves widely implemented improvements based on high-risk roadway features correlated with specific severe crash types.” (FHWA)
Systematic	Methodical approach to implementing safety treatments based on unique site-specific considerations.
TIM	Traffic Incident Management
WMSRDC	West Michigan Shoreline Regional Development Commission
WESTPLAN MPO	West Michigan Metropolitan Transportation Planning Program (Including Muskegon and Northern Ottawa Counties)

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1 INTRODUCTION

The West Michigan Metropolitan Transportation Planning Program (WestPlan MPO) took the initiative to begin development of a Safety Action Plan geared toward future Safe Streets and Roads for All (SS4A) safety initiatives. The Michigan Department of Transportation supported this effort through the Local Safety Initiative office and was facilitated by WSP. The WestPlan MPO has also taken steps to help increase public stakeholder engagement and collect additional equity related information.

These efforts are in support of the reduction in fatal and incapacitating injury crashes on the WestPlan MPO transportation network and are guided by the Safe System Approach (SSA). SSA looks to address road safety by lowering overall speeds, reducing the kinetic energy involved in crashes. **Figure 2** provides a high-level overview of the five main tenants of The Safe System Approach which in turn guides the SS4A program in working toward zero fatal and incapacitating injury crashes.

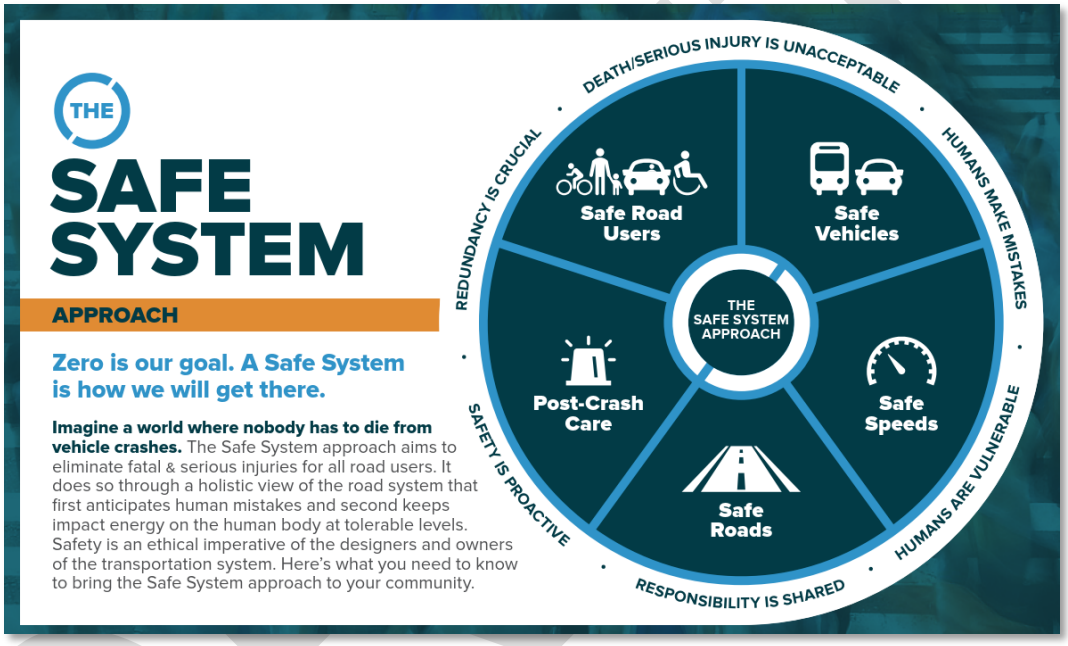


Figure 2 - The Safe System Approach (Source: FHWA)

The purpose of this Safety Action Plan is to collect and analyze crash data, stakeholder guidance, demographic data, and other safety information for a more equitable data driven safety analysis. This data has been used to help identify safety Emphasis Areas as well as treatment strategies addressing local concerns and includes both systemic and systematic approaches. While some preliminary equity analysis and considerations have been incorporated here, additional consultation and review are recommended.

1.1 BACKGROUND

Previous efforts in the Region included the 2017 West Michigan Shoreline Regional Development Commission Regional Transportation Safety Plan and other local safety projects and programs. Plans to update the previous Safety Plan coincided with updated guidance in the form of the Safe System Approach and subsequent Safe Streets and Roads for All program. This approach includes both reductions in kinetic energy involved in crashes through lower speeds and other means, as well as incorporating demographic equity analysis and a focus on vulnerable populations to better ensure areas and communities of greatest need are equitably represented in treatment programs and considerations.

The purpose of this document is to help provide local agencies, community organizations, and local stakeholders with guidance regarding data driven areas of concern and applicable treatment strategies. The WestPlan MPO area encompasses Muskegon County and the northern portion of Ottawa County as shown in **Figure 3**. In addition to the overarching SSA goal of zero fatalities and incapacitating injuries, other goals identified by the WestPlan MPO are also noted in the following sections.

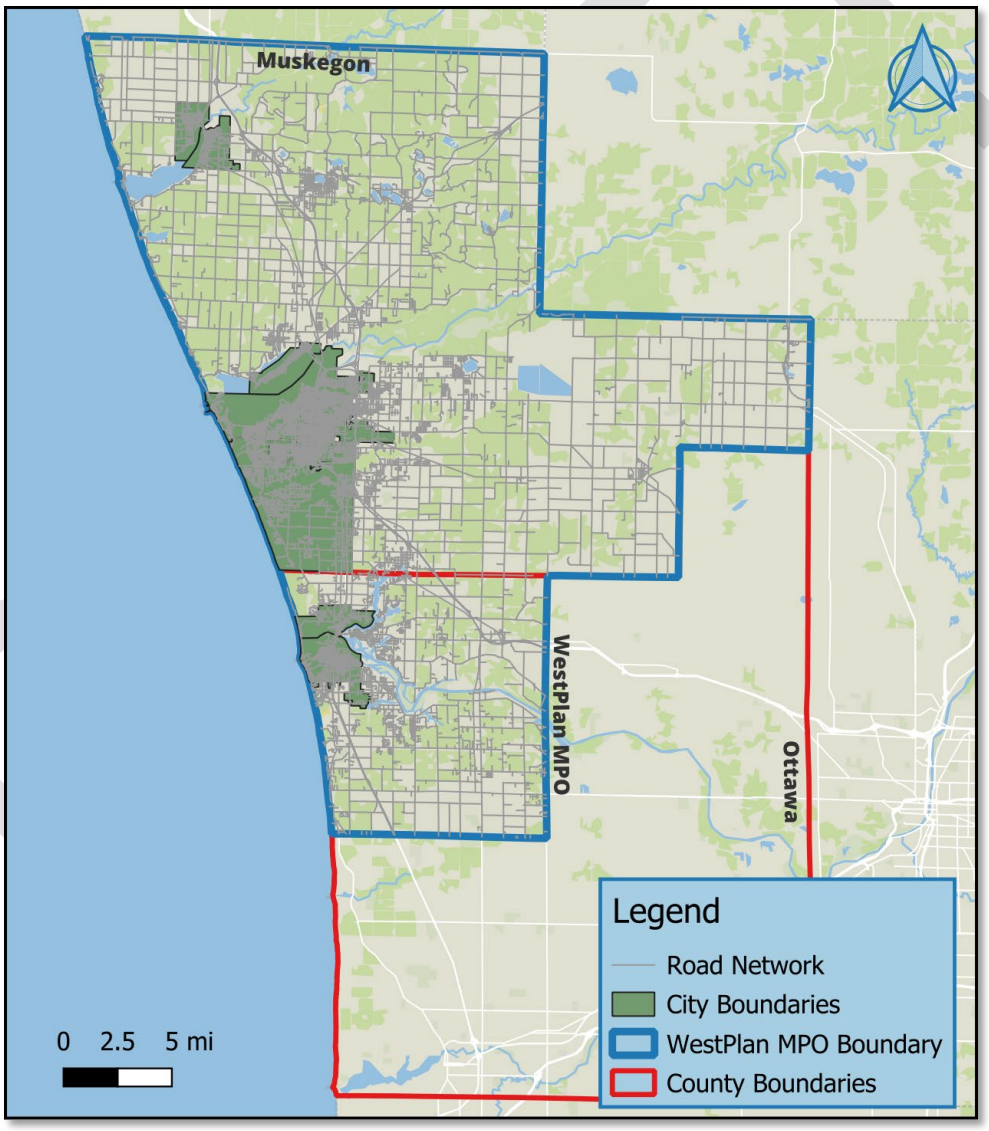


Figure 3 - West Michigan Metropolitan Transportation Planning Program Service Area

1.2 GUIDING PRINCIPALS

The following guiding principles flow from both the Statewide Highway Safety Action Plan as well as the previous 2017 WMSRDC Regional Transportation Safety Plan. These work in support of the overall goal of zero fatal and incapacitating injury crashes on the WestPlan MPO transportation network.

1.2.1 MISSION

The Mission supports the Vision and provides a high-level directional guide in achieving that goal.

Improve overall traffic safety and eliminate fatal and incapacitating injuries on the WestPlan MPO transportation network through equitable, collaborative, community focused safety programs and efforts.

1.2.2 VISION

The Vision provides an intentional and aspirational aim for the future of the WestPlan MPO where individuals living, working, and visiting the region can do so without risk of fatal or incapacitating injuries on the transportation network.

Zero fatalities and incapacitating injuries on WestPlan MPO transportation networks.

1.2.3 GOALS

Following the Safe System Approach, the overarching goal for the WestPlan MPO safety plan is:

Zero Fatalities and Incapacitating Injuries on the MPO's transportation network.

Additional goals and metrics for monitoring safety performance within the WestPlan MPO have been identified to help monitor progress related to each Emphasis Area. These would be tracked by Crashes per Capita or Crashes per 100 million Vehicle Miles Traveled (MVMT) and include:

- 25% Reduction in Intersection Sight Distance & Traffic Control Related Crashes by 2035
- 25% Reduction in Lane Departure Related Crashes by 2035
- 30% Reduction in Impaired Driver Involved Crashes by 2035
- 30% Reduction in Driver Behaviour Related Crashes by 2035
- 25% Reduction in Motorcycle Involved Crashes by 2035
- 30% Reduction in Vulnerable Road User Involved Crashes by 2035
- Systemic Implementation of Wrong-Way Driving Prevention Treatments[1]

[1] Due to the nature of Wrong-Way Driving Crashes monitoring of crash rates may not be representative of actual performance.

2 SAFETY ACTION PLAN METHODOLOGY

2.1 CRASH DATA ANALYSIS (2018 – 2022)

An analysis of available crash data from 2018 through 2022 was completed for the WestPlan MPO based on data provided by the Michigan Department of Transportation (MDOT) via the Department's RoadSoft Analysis tool as well as access to the Numetric-sourced crash data. This analysis along with stakeholder consultation helped to guide discussions around emphasis areas and strategy identification. **Figure 4** provides a comparison of the relative proportion of fatal and incapacitating injury crashes Statewide versus within the WestPlan MPO. While the data appears to show a slight decrease in crashes in 2020 during the height of the Pandemic, additional strides can be taken to work toward the Safe System Approach and WestPlan MPO goal of zero fatalities and incapacitating injuries. A summary of crash statistics by County is provided in the Appendix with some high-level comparisons provided below.

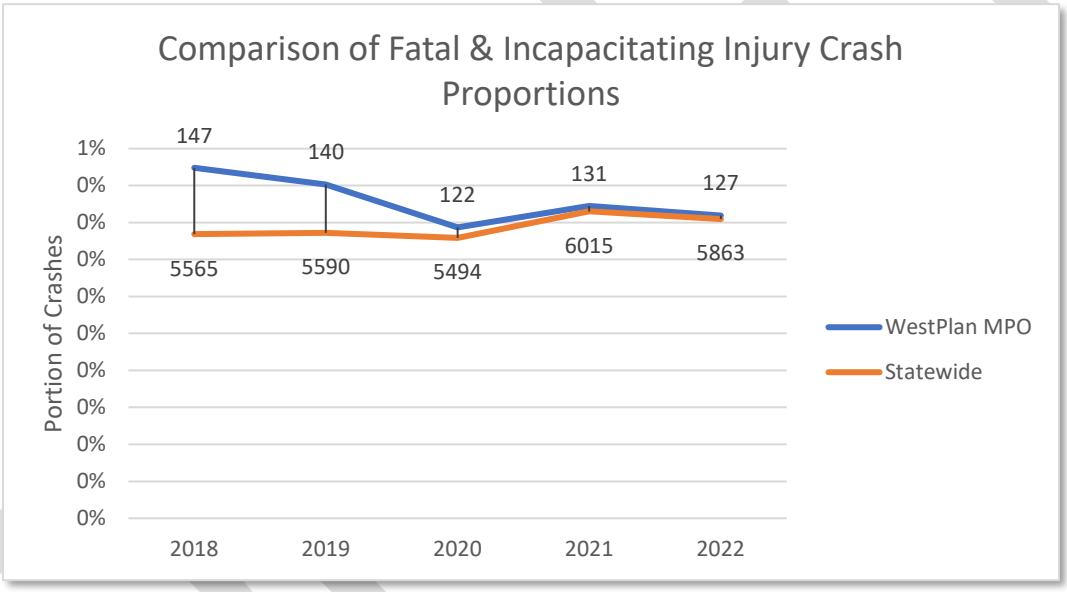


Figure 4 - Comparison of Statewide vs WestPlan MPO Fatal & Incapacitating Injury Crashes

2.1.1 COUNTY DATA COMPARISON

The following tables and figures provide comparisons between the Muskegon and Ottawa portions of the WestPlan MPO, followed by discussions of the combined analysis. **Figure 5** provides a comparison of the crash severity distributions for the crashes which occurred in Muskegon or Ottawa County within the MPO area during the 2018 through 2022 period. The distribution of crashes by severity in each case is relatively similar with approximately 82-85% of reported crashes resulting in property damage only. During the five-year period, approximately 1.8% of all crashes reported in the MPO portion of Ottawa County and 2.3% of all crashes reported in Muskegon County resulted in a fatality or incapacitating injury.

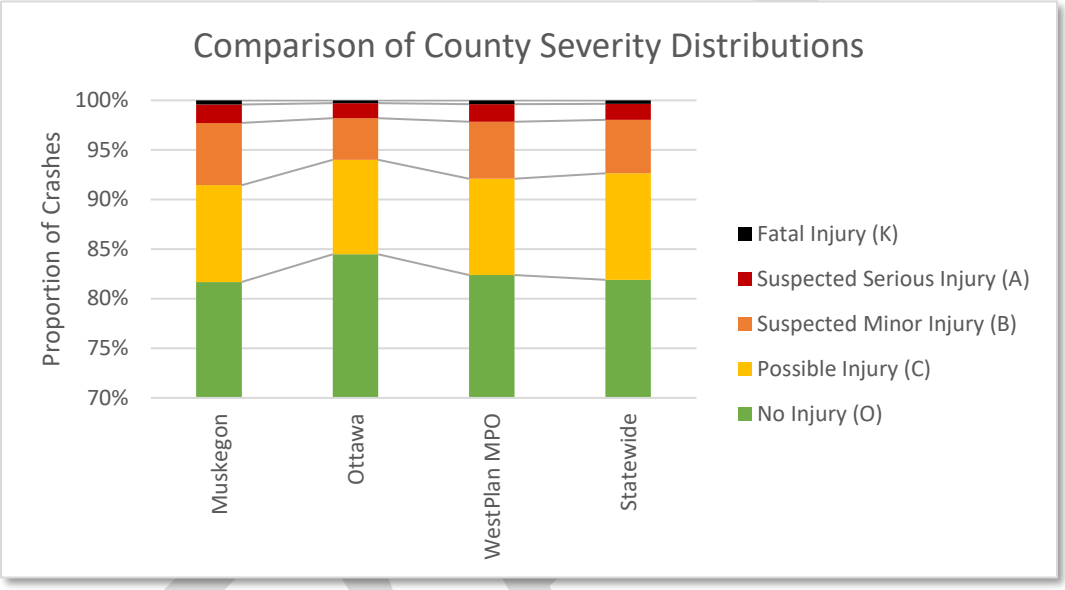


Figure 5 - Comparison of Muskegon & Ottawa County Severity Distributions

Figure 6 provides a comparison between the distribution of crash types for crashes resulting in incapacitating injuries or fatalities for both portions of the WestPlan MPO, sorted by overall frequency. As shown the most frequently reported crash types within the MPO included single motor vehicle, angle, rear end, and head on crashes. While this is largely dictated by the preponderance of Muskegon based crashes, very similar trends emerge when considering the MPO portion of Ottawa County.

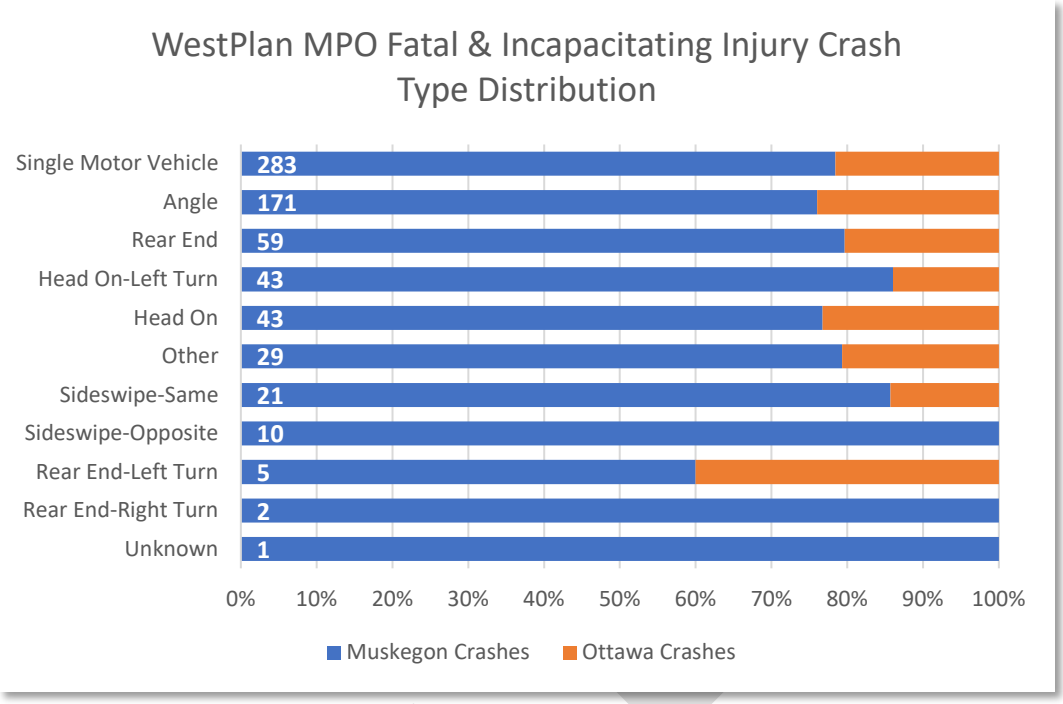


Figure 6 - WestPlan MPO Fatal & Incapacitating Injury Crash Comparison

When considering crash distribution by month of year, trends emerge from the fatal and incapacitating injury crashes and all severity crashes. As shown in **Figure 7**, crashes of all severities increased during the summer month generally, with a more pronounced peak in the winter months. When considering fatal and incapacitating injury crashes, the subset peaks significantly during the summer months. While the sample size is smaller for the MPO portion of Ottawa County, it also appears to follow this trend.

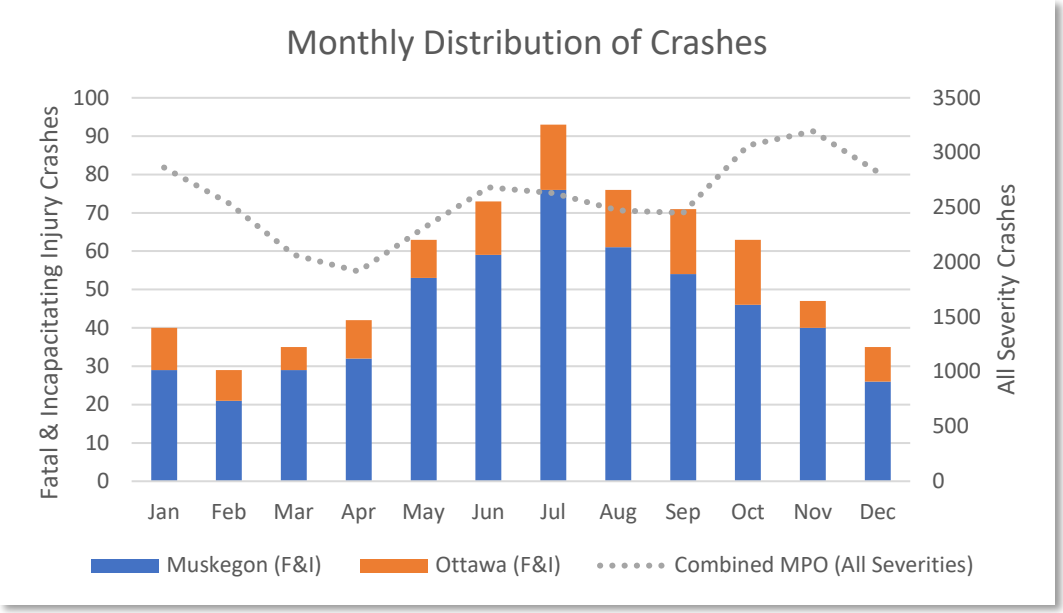


Figure 7 - WestPlan MPO Monthly Distribution of Crashes

2.1.2 PRELIMINARY EQUITY CONSIDERATIONS

A critical consideration regarding crash outcomes is the disproportionate impact severe crashes have on Black, Indigenous, and other People of Color. **Table 1** provides data from the USDOT Equitable Transportation Community Explorer summarizing the portion of population across the State of Michigan and WestPlan MPO which are considered Disadvantaged Communities[2].

Table 1 – 2020 Census Disadvantaged Communities

	STATEWIDE	WESTPLAN MPO	MUSKEGON COUNTY	OTTAWA COUNTY (MPO PORTION)
Total Population	10,000,000	231,000	173,700	57,300
Population within Disadvantaged Census Tracts	3,200,000 (34%)	73,800 (36%)	67,600 (42%)	6,200 (14%)

Disadvantaged Census scores are comprised of five component scores: Climate & Disaster, Environmental, Health Vulnerability, Social Vulnerability, and Transportation Insecurity. All components represent critical aspects of life for an individual. **Figure 8** provides the component scores for the WestPlan MPO with additional charts provided in the Appendix. As shown, Transportation Insecurity is the leading component score, with Transportation Access being the leading indicator within that subset. It should also be noted that these scores are based on County or MPO wide data. Areas of greater concentration of disadvantaged communities exist within the WestPlan MPO and should be considered a priority when identifying and planning treatment strategies.

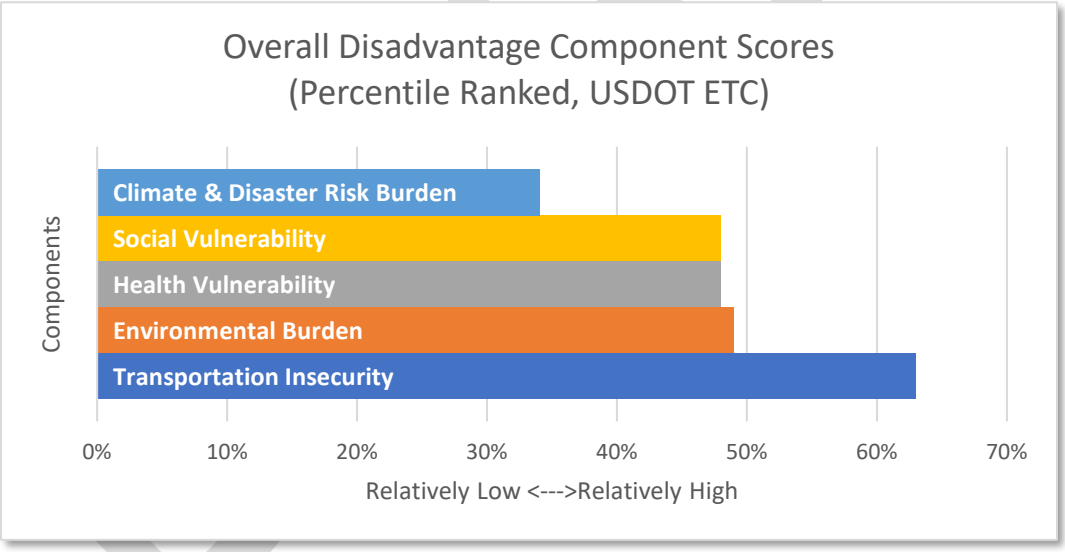


Figure 8 - WestPlan MPO Disadvantaged Community Component Scores

Data collected by responding officers includes driver demographic information in addition to other crash attributes. This additional demographic data including the driver's perceived race was not collected until 2020 with varying levels of completeness. This level of understanding within the crash data is expected to improve over time, but equity outreach and engagement will be critical to support and guide these and future efforts. At a high level, **Figure 9** below provides crash outcomes by driver race as reported by responding officers for the subset of crash data. As

[2] ETC Explorer - National Results | USDOT Equitable Transportation Community (ETC) Explorer (arcgis.com)

shown, despite accounting for smaller portions of the overall crash data, crashes involving Native Americans, Black, or Hispanic individuals were more likely to result in a severe injury or fatality. While some of the individual demographic categories contain smaller sample sizes, they speak to the broader trend of Black, Indigenous, and People of Color being disproportionately impacted by severe crash outcomes. Prioritization of safety strategies and treatments should work to address these discrepancies while improving transportation safety for the overall population.

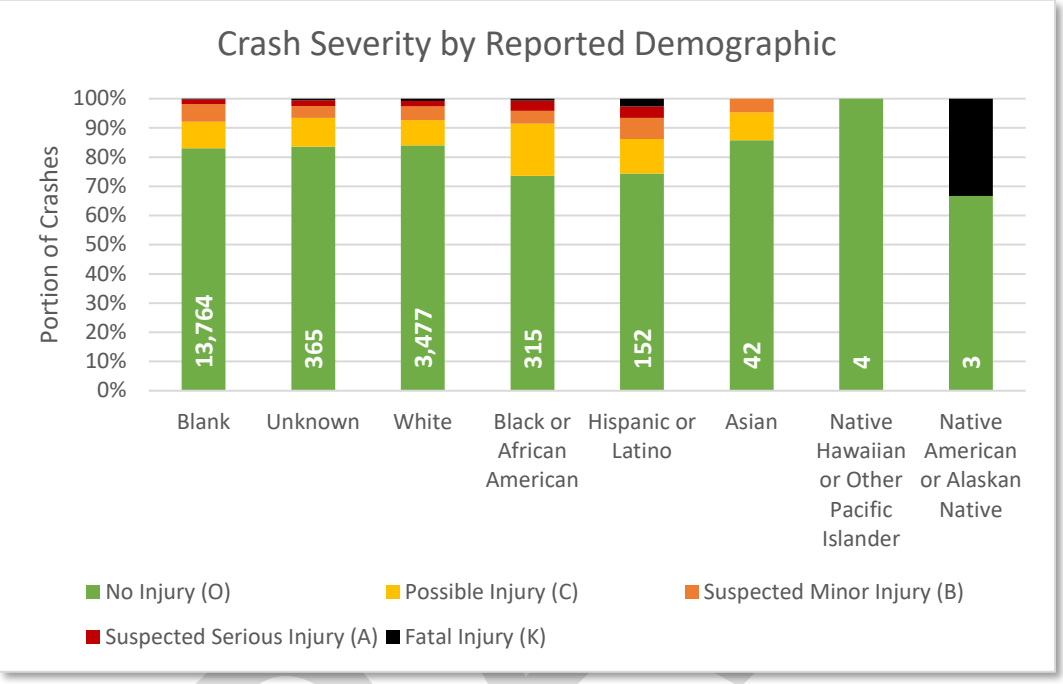


Figure 9 - WestPlan MPO Crash Severity by Driver Demographics (2020 - 2022)

2.1.3 CRASH SEVERITY & LOCATION

While the focus of the SS4A program is the push toward zero fatalities and incapacitating injuries, crashes of other severities are important to consider as they provide broader context. **Figure 10** provides the distribution of crash types reported within the MPO when considering crashes of all severities, as well as fatal and incapacitating injury specifically. While there is some overlap with the most frequently cited fatal and incapacitating injury crash types, single motor vehicle, angle, rear end, and head on related crashes accounted for approximately 90% of all reported fatal and incapacitating injury crashes and 80% of reported crashes of all severities.

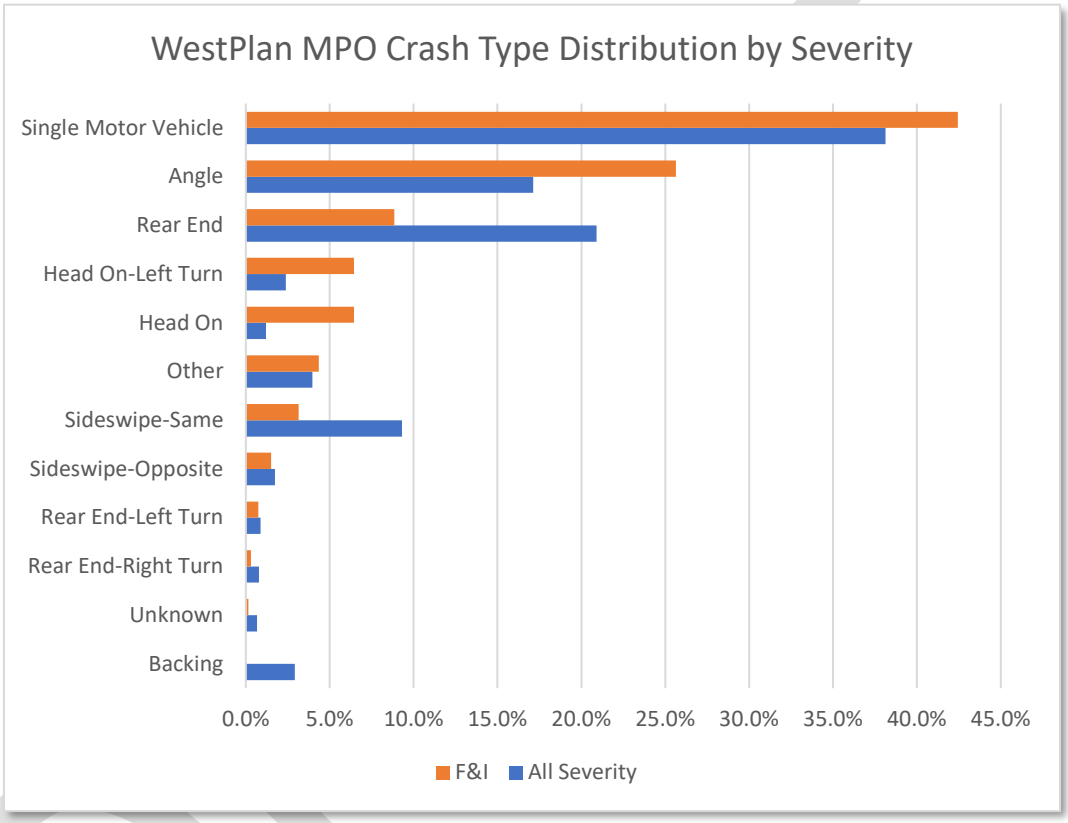


Figure 10 - WestPlan MPO Crash Severity Distribution - All Crashes

'Safe Vehicles' is one of the core components of the Safe System Approach. While this refers to the maintenance and upkeep, advances in vehicular safety technology, etc., there are also crash-based considerations. Different vehicles perform differently under varying geometric, environmental, and other conditions which may impact crash outcomes. **Figure 11** provides a high-level overview of crash severity by involved vehicle type. It should be noted that these counts overlap as this includes all crashes, both single and multi-vehicle. As shown, motorcycles crashes tended to result in more severe or fatal outcomes when compared to other vehicle types. Additionally, despite lower overall numbers, moped- and ATV-involved crashes also resulted in severe or fatal outcomes more frequently than the general crash dataset.

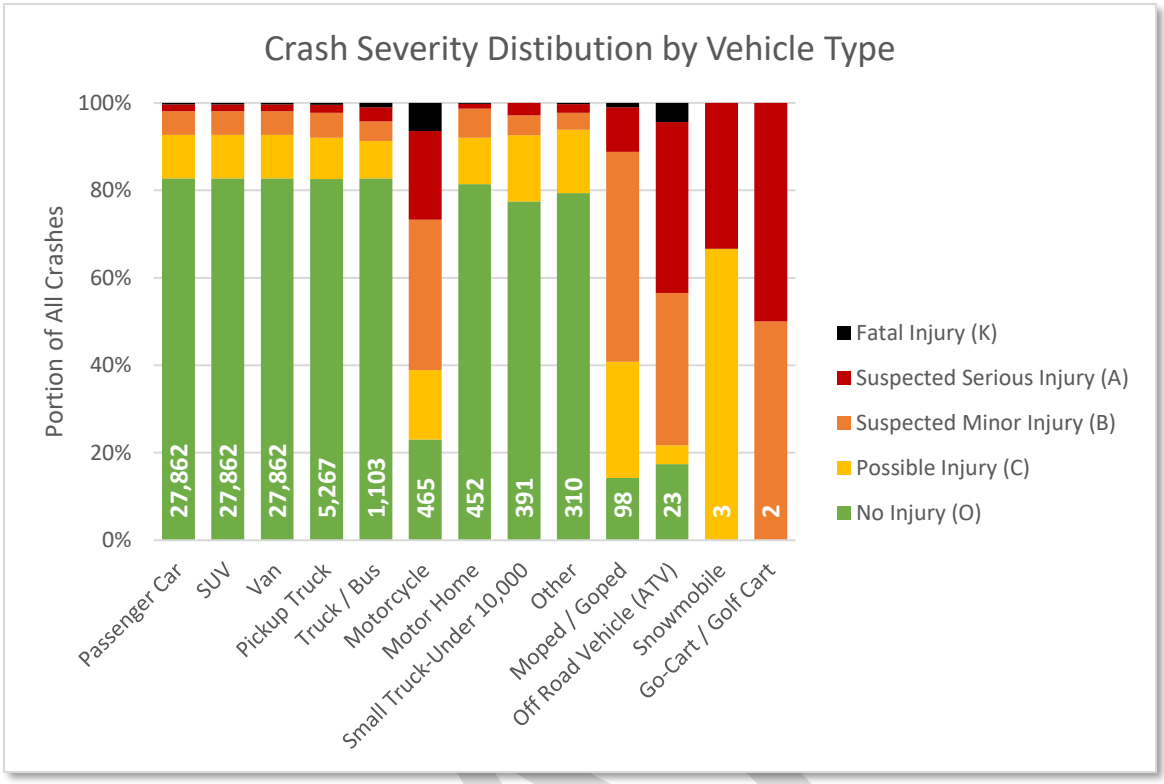


Figure 11 - WestPlan Crash Severity by Vehicle Type

In addition to considering the distribution of crash types and severities over time, the type of locations where crashes occur are also critical to understanding potential causes and solutions. **Figure 12** provides a high-level example of this with a breakdown in the types of fatal and incapacitating injury crashes reported in the study area by intersection vs segment type locations. This information is organized by intersection vs segment ratio with the total number of crashes across both noted on the right side. As shown, while some crash types are prevalent in both types of areas, some heavily favor one or the other. This type of information, when paired with more robust geospatial analysis, will help to identify hot spots, understand potential underlying causes, and potentially identify targeted solutions.

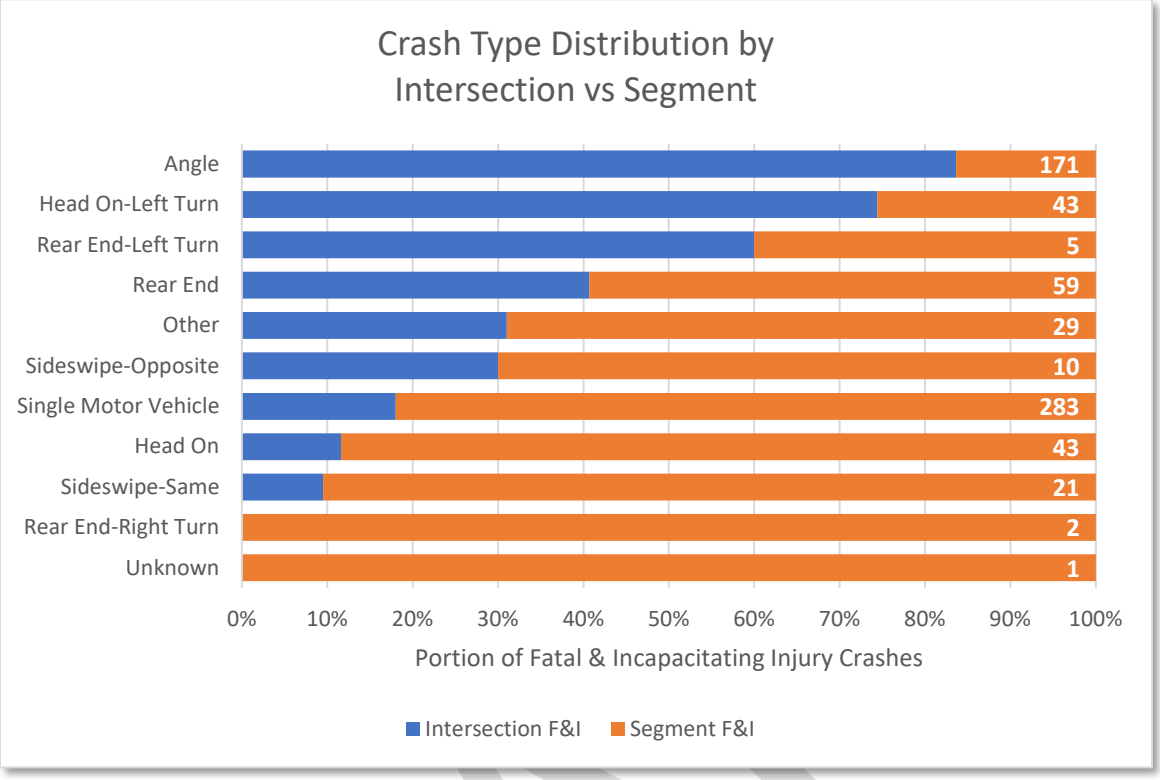


Figure 12 - WestPlan MPO Ratio Fatal & Incapacitating Injury Crash Types by Location

2.1.4 TEMPORAL & ENVIRONMENTAL TRENDS

Figure 13 provides a summary of the distribution of crashes by reported surface condition. Categories with proportions less than 0.2% in either category have been omitted for legibility. As shown below, when considering crashes of all severities, two-thirds occurred under dry conditions. This portion increases to more than 75% when considering fatal and incapacitating injuries only. While this requires additional analysis to determine potential causes for the distribution, it could be due in part to higher speeds on dry roads. This would align with the fatal and incapacitating crash distribution by month where crashes peaked significantly in the summer months. Additionally, the greater portion of crashes of all severities occurring on wet or otherwise impacted surface conditions could align with the winter month peak when considering crashes of all severity types.

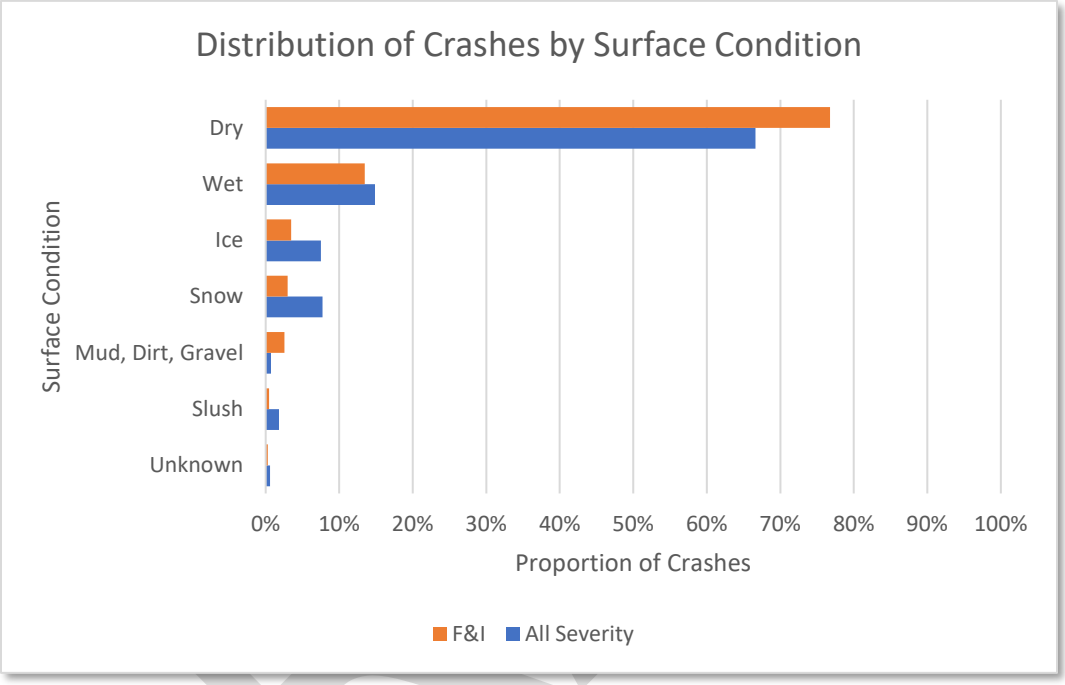


Figure 13 - WestPlan MPO Surface Condition Distribution of Crashes

When considering crashes by temporal trend, both in terms of day of week and month of the year, a summer trend emerges as shown in **Figure 14**. Increased tourist activity and better weather may contribute to this increase in crashes and may suggest treatments geared toward visitors to the area may plan a significant role in moving the WestPlan MPO toward zero fatal and incapacitating injury crashes. Similarly, when considering crashes by day of the week, there is a slight increase in fatal and incapacitating injury crashes as shown in **Figure 15**.

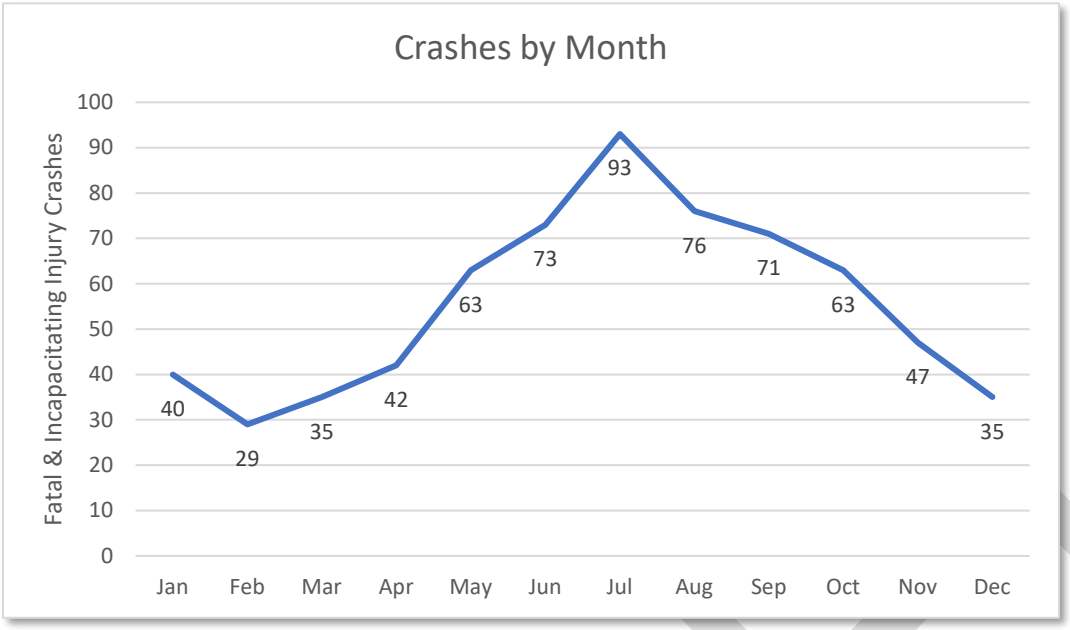


Figure 14 - WestPlan MPO F&I Crashes by Month

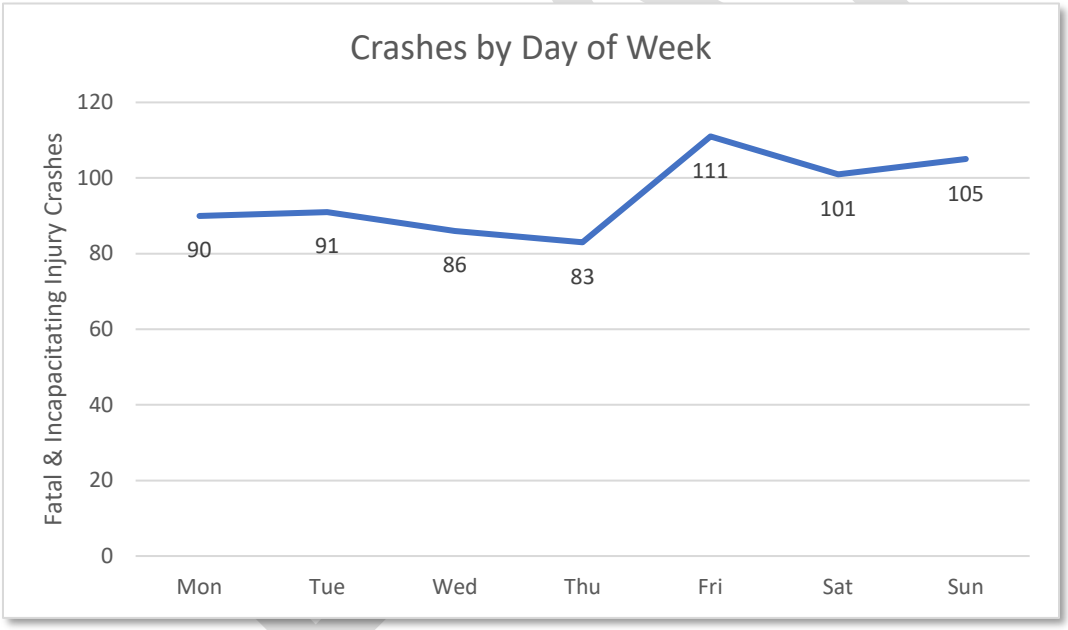


Figure 15 - WestPlan MPO F&I Crashes by Day of Week

2.2 PLANNING STRUCTURE AND STAKEHOLDER INVOLVEMENT

The WestPlan MPO Technical Committee and MPO staff are charged with developing, maintaining, and monitoring the Safety Action Plan for the MPO. In addition, a stakeholder committee was established to provide additional input from individuals and agencies not represented by the MPO members. On Monday, June 12th, Thursday, July 13th, and Tuesday, September 5th, 2023, stakeholders met at the West Michigan Shoreline Regional Development Commission offices in Muskegon, MI and virtually to discuss preliminary crash data analysis, identification of emphasis areas, and review of potential treatment strategies. A range of stakeholders were in attendance including representatives from local Municipalities, the Michigan State Police, Local Fire Departments, Public Health, MDOT representatives from the Grand Region and Muskegon TSC, as well as members of the WMSRDC and WestPlan MPO. In addition to providing a brief overview of the safety plan development process and initial data analysis, one of the items of discussion included the identification of potential emphasis areas. The following list includes a representative sample of the issues and concerns raised at the meeting. These topics were used to guide additional crash data analysis and the selection of emphasis areas in the following section.

- **Intersection Concerns** (Urban, Rural High Speed, Sight Distance, etc.)
- **Vulnerable Road Users** (Pedestrian Crossings, Non-motorized Users on Roadside, etc.)
- **Wrong-Way Driving Incidents** (Unfamiliar or Under the Influence, Head-on, Distracted Driving, etc.)
- **Transit Accessibility** (Stop Amenities, Accessibility, Wayfinding Support)
- **Motorcycle Involved Crashes**
- **Driver Behavior** (Speeding, Distracted Driving, Failure to Yield, etc.)
- **Equity Considerations** (Safety Outcomes by Demographic Data, Underserved Populations, Etc.)

In addition to the stakeholder meetings, the WestPlan MPO utilized its Public Involvement software, Community Remarks to garner input from the public as well. The public was able to comment on the projects identified for the Safety Action Plan, as well as comment on any other safety concerns and locations within the MPO boundaries. These comments are included in the Appendices on page 107.

The Safety Action Plan was adopted on April 17, 2024, by the WestPlan MPO Policy Committee.

3 WESTPLAN MPO EMPHASIS AREAS & STRATEGIES

3.1 GENERAL NOTES

As part of the Safety Plan development process several emphasis areas were identified through crash analysis and stakeholder engagement. The concerns and topics discussed at the early stakeholder meeting were used to guide and focus the crash analysis, as well as identify a final list of emphasis areas. **Table 2** provides a summary of related stakeholder discussions and additional crash data analysis. Future and ongoing Equity and Engagement efforts at the WestPlan MPO will provide significant support in ensuring future updates continue to improve equitable implementation of safety treatments.

Table 2 – 1st Stakeholder Meeting Topic Summary

Preliminary Stakeholder Meeting	Preliminary Crash Data Analysis
• Driving Under the Influence • Intersection Concerns • Speeding • Transit Accessibility • Vulnerable Road Users • Wrong-Way Driving Incidents • Motorcycle Involved • Driver Behavior • Equity Considerations	• Single Vehicle • Angle Crashes • Rear End (Straight & Turn) • Head-On (Straight & Left Turn) • Motorcycle Involved • Vulnerable Road Users

The topics and areas of concern collectively accounted for at least 96% percent of the fatal and incapacitating injury crashes reported within the MPO during the study period. While some categories listed above have clearly defined attributes within the crash data set, several are more difficult to quantify. These include Wrong-Way Driving Incidents and Transit Accessibility among others. The following sections provide a summary of the Emphasis Areas identified as well as associated treatment strategies. Several categories listed above have been combined given the broad overlap in the stakeholder identified areas and those identified in the crash analysis.

Ongoing and future Equity and Engagement efforts at the WestPlan MPO are critical to any future Safety Action Plan updates. Where feasible, preliminary equity considerations have been incorporated here, but should be further interrogated and will provide significant support in revising and focusing these emphasis areas as needed and the application of identified treatments and strategies. **Table 3** on the following page provides a summary of emphasis areas and treatment strategies organized from greatest to least proportion of fatal and incapacitating injury crashes with additional details provided in the following sections.

The strategies presented below are organized by the Emphasis Area they are primarily associated with. These safety treatments are anticipated to provide some level of benefit for crashes falling under other Emphasis Areas, such as speed related treatments also having a positive impact on vulnerable road user involved crashes. Site specific safety enhancements will require additional screening and field investigation along with treatment coordination and design. The strategies identified below may be used on their own or in coordination with others to work toward zero fatalities and incapacitating injuries.

Table 3 - Emphasis Area & Strategy Summary

EMPHASIS AREAS	% OF F&I CRASHES	POTENTIAL STRATEGIES FOR DISCUSSION
Intersection Sight Distance & Traffic Control	**41%**	• Sight Distance & Roadside Maintenance • Improve Traffic Control Visibility • Dilemma Zone Detection • Dynamic All-Red Extension • Visual Based Detection • Advanced Signage & Pavement Markings • Transverse Rumble Strips • Roundabouts
Lane Departure Crashes	**37%**	• Enhanced Curve Delineation • Install or Expand Paved Shoulders • Safety Edge Treatment • Review & Update Passing Lanes • High Friction Surface & Other Surface Treatments • Center & Edgeline Rumble Strips • Improved Nighttime Delineation
Impaired Driver Involved Crashes	**28%**	• Transit & Ridesharing Programs • Drug Recognition Expert (DRE) Training • High Visibility Enforcement Campaigns • Education & Treatment Awareness Campaigns
Driver Behavior Related Crashes	**20%**	• Automated Enforcement • Mobile & Fixed Speed Feedback Signs • Road Diets & Complete Streets • Traffic Calming Projects • Distracted Driver Education Campaign
Motorcycle Crashes	**19%**	• Education Campaign • Enforcement Campaign • Motorcycle Focused Emergency Response Training
Vulnerable Road Users	**8%**	• Transit Access • Crosswalk Improvements • Sidewalk & Multi-Use Trail Connectivity • Bike Lanes & Sharrows • Reduce Lighting Gaps • Community Education & Awareness Programs
Wrong-Way Driving	**Unk**	• Signing & Pavement Marking Enhancements • Geometric Enhancements • Lighting & Delineation • ITS & Signal Treatments • Wrong-Way Driving Network Screening

3.2 INTERSECTION SIGHT DISTANCE & TRAFFIC CONTROL

During preliminary discussions with stakeholders, general concerns regarding intersection safety were raised, both in terms of rural stop-controlled intersections as well as more urban built-up locations. When considering fatal and incapacitating injury crashes specifically, both urban and rural intersections are represented across the MPO. However, while accounting for approximately 8.4% of all intersection crashes, rural intersection crashes accounted for a significantly higher proportion of severe and fatal crashes (33% of fatal and 21% of incapacitating injury intersection crashes). **Figure 16** provides a high-level overview of intersection related crashes as coded by the responding officer.

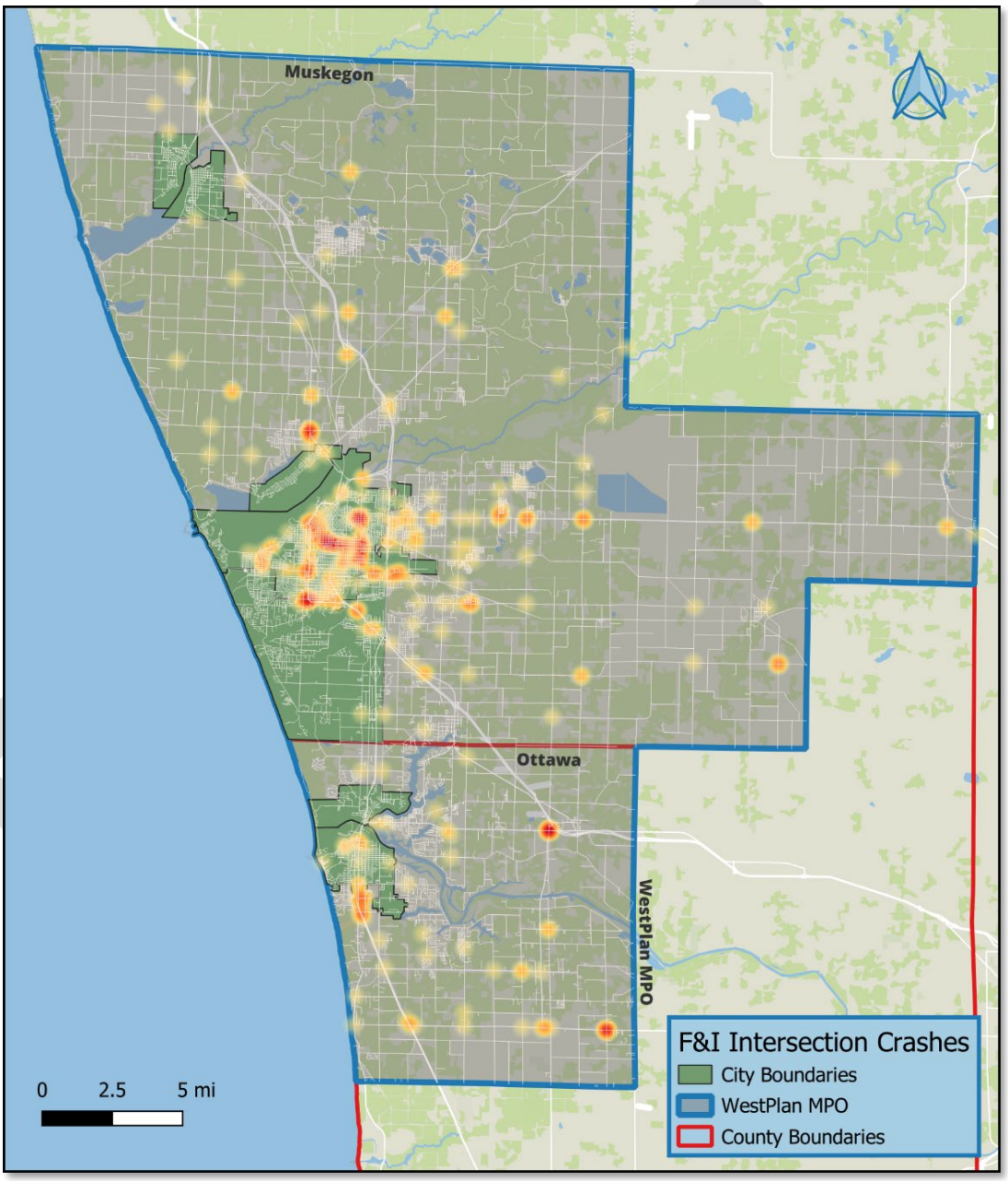


Figure 16 – Intersection Related Fatal & Incapacitating Injury Heatmap

Angle and head-on left turn crashes were some of the most frequently reported crash types overall and at intersections specifically (2nd and 4th most frequently cited). This is due in part to the nature of intersection conflict points created by opposing traffic flows, the colocation of several modes of travel (vehicle, pedestrian, transit, etc.), multiple conflict points, as well as varied land uses and access points within the influence area.

As illustrated previously, most crash types occur at both intersections and segments under different conditions and situations. When considering fatal and incapacitating injury crashes, the following crash types shown in **Figure 17** were reported predominantly at intersections versus segments within the study area. Other potential concerns related to intersections not specifically tied to the crash data could include accessibility and wayfinding, condition of existing traffic control devices, access management, and other intersection geometrics.

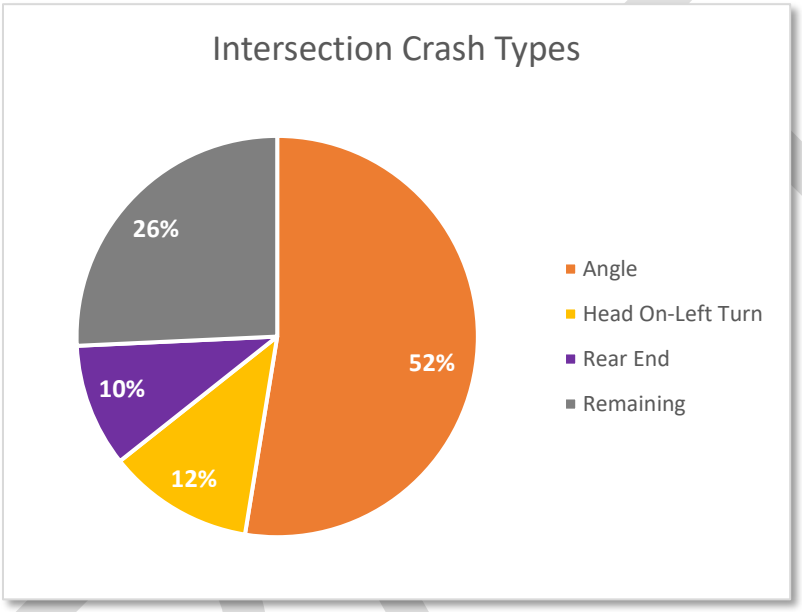


Figure 17 - Predominant Intersection Crash Types

Other potential concerns related to intersections not specifically tied to the crash data could include accessibility and wayfinding, condition of existing traffic control devices, access management and other intersection geometrics. Concerns falling under this emphasis area may be broken out by crash type, type of intersection (stop controlled, traffic signals, roundabouts, etc.), or general land use (rural vs urban) among others. **Figure 18** provides an overview of reported crash types for fatal and incapacitating injury crashes by traffic control type.

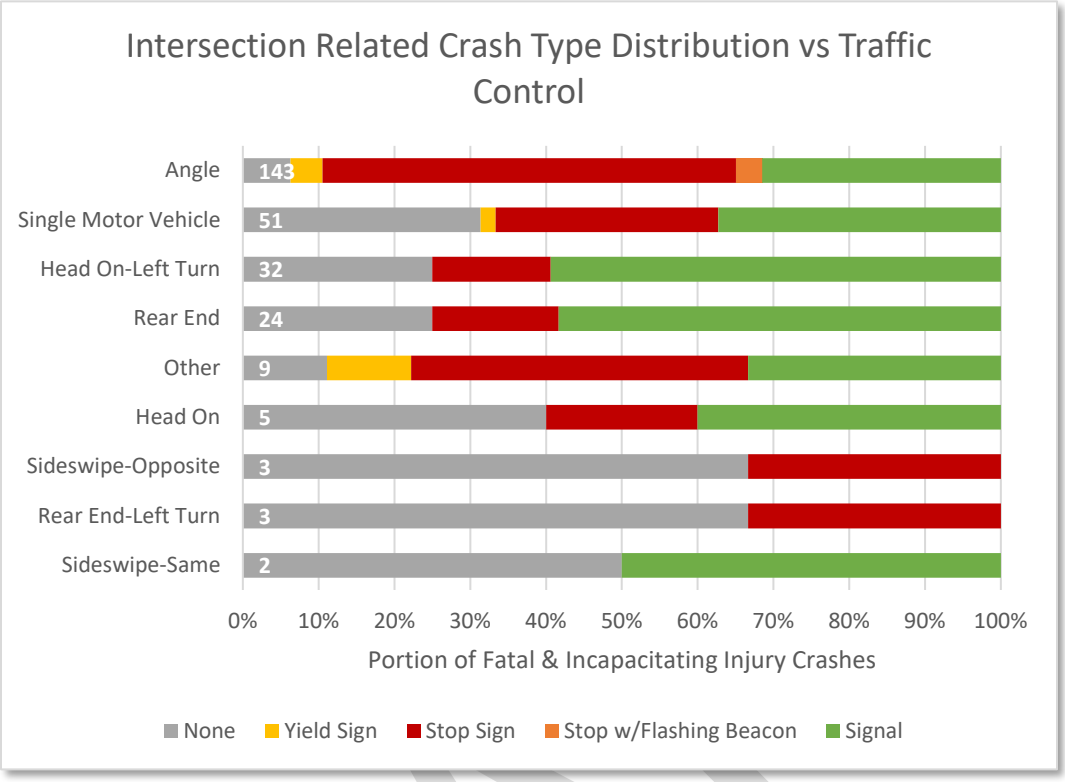


Figure 18 - WestPlan MPO F&I Crash Distribution by Traffic Control Type

3.2.1 STRATEGIES

SIGHT DISTANCE & ROADSIDE MAINTENANCE

Maintaining clear sight distance is a critical component of all driving tasks. Advanced sight distance provides drivers with sufficient time to complete wayfinding, guidance, and navigation tasks, as well as identifying changes in conditions ahead. Limited sight distance restricts road user's ability to see cross-traffic or other conflicts and may encourage drivers to pull into the intersection. Maintaining appropriate sight distances and sight triangles around intersection approaches provides drivers with a clear view of oncoming traffic, helping to reduce the potential for these crashes. Some examples of treatments which help to maintain sight distance at intersections is included in **Table 4** below.

Table 4 - Sight Distance Examples by Area Type

Urban Treatments	Rural & Suburban Treatments
• Restrict parking near intersections/crossings • Reduce visual clutter along intersection approaches • Review and Update Stop Bar Placement	• Vegetation Trimming & Roadside Maintenance • Rural Intersection Clear Sight Triangles • Intersection Lighting • Review and Update Stop Bar Placement

IMPROVE TRAFFIC CONTROL VISIBILITY

Obstruction of traffic control devices increases the potential for significant crashes in addition to reduced operational performance. Clearly visible traffic control devices help to provide drivers with sufficient time and distance to respond to changing conditions or continue guidance and navigation tasks. Working to address traffic control visibility requires different actions depending on the type of traffic control and on-site conditions. Some examples typically associated with different traffic control schemes are provided in **Table 5** below:

Table 5 - Traffic Control Visibility Example by Control Scheme

Stop Controlled Intersections & Roundabouts	Traffic Signals
• Replace Worn/Faded Signs • Trimming Roadside Vegetation/Obstructions • Install Retroreflective Sheeting on Signposts • Oversize Traffic Control Signs • Double Stop Signs • Install LED Stop Signs • Install Intersection Lighting	• Install Backplates with Retroreflective Tape • Upgrade to Box Span Signal Layouts • Review Signal Head Placements & Cone of Vision • Consider Supplemental Signals

Figure 19 - Oversized Sign Comparison (Left, FHWA) & Double Stop Sign (Right, CFTR – Iowa State University)

DILEMMA ZONE DETECTION

Dilemma zone detection should be considered at intersections experiencing high speed crashes or other instances where drivers are unable to stop in assured clear distances. These systems tie into the traffic signal controller and, using a series of detectors, monitor approaching vehicles speeds. The system then estimates whether the vehicle will be able to stop in time before the signal changes to red. If it determines a safe stop is unlikely, it may be able to extend the green time, allowing the vehicle to safely traverse the intersection. This has been shown to reduce severe crashes and could be paired with other intersection visibility treatments to further aid drivers.

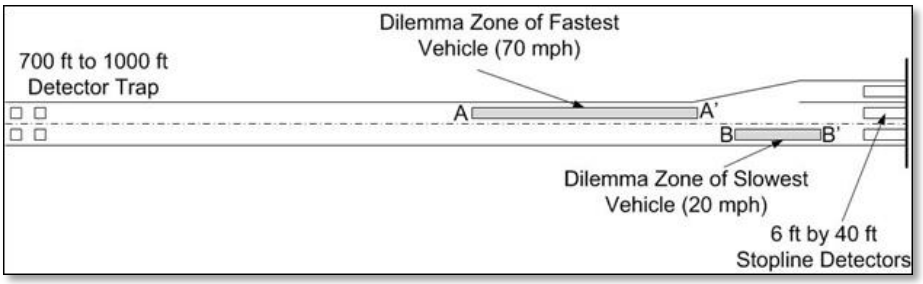


Figure 20 - Dilemma Zone Detection Approach (FHWA)

DYNAMIC ALL-RED EXTENSION

The State of North Carolina has found success in reducing red light running crashes at rural three- and four-way rural signalized intersections using a Dynamic All-Red Extension (DARE) system. The system is intended to reduce angle, left turn, right turn, and head on crashes by extending the all-red phase to help prevent new drivers from entering the intersection when a high-speed vehicle is detected. Based on a previous North Carolina based study, the system was ineffective at two lane vs two lane intersections but saw statistically significant reductions in crashes of all severities at and at multilane vs two lane rural intersections with a 35% reduction in target crashes.

VISUAL BASED DETECTION

Other kinds of vehicular detection widely used at signalized intersections are primarily intended to assist with operational concerns and adjustments. For camera detection, however, these feeds could also be used by emergency services and agency operators to respond more quickly to a crash occurring at the intersection. If monitored, the feed provides a chance to identify the crash in real time, but also provide responding personnel with site specific information in addition to any 911 calls that may have been received.

ADVANCED SIGNAGE & PAVEMENT MARKINGS

The installation of new or supplemental intersection warning signs should be considered at locations with limited sight distance, significant distances between intersections, or are otherwise more difficult to see on approach. This would provide the driver with additional time to scan for changing conditions, increasing potential available reaction time for the presence of an upcoming intersection and focus their attention accordingly. They are typically installed paired with a flashing beacon or LED sign border. This can be activated as needed which is typically preferred as it maintains effectiveness over a longer period.

Additionally, consider installing additional lane use signs at more complex intersections or locations with a prevalence of sideswipes and read ends related to last minute lane changes. This could include overhead lane use signs for any appropriate locations. This provides drivers with additional guidance regarding the operation of the intersection.

Similar to the advanced lane use signs, consideration should be given to installing advanced route pavement markings at intersections with route course changes. This would assist drivers in selecting the correct lane and may be particularly beneficial at roundabouts, diverging diamond intersections, or other more complex or newer intersection configurations.

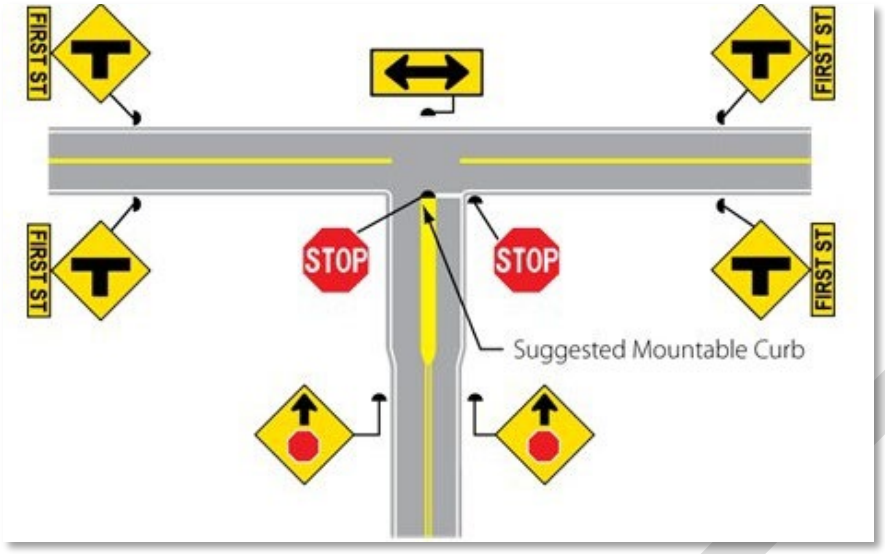


Figure 21 - Advanced Intersection Signage (FHWA)

TRANSVERSE RUMBLE STRIPS

Installation of rumble strips across the travel lanes on approaches to stop controlled intersections and roundabout approaches provide drivers with audible and tactile feedback alerting them to the presence of the intersection and encouraging lower speeds or other corrective actions. In previous studies, transverse rumble strips resulted in a statistically significant reduction in fatal and incapacitating injuries at both three- and four-legged intersections.[3] This treatment would typically be more appropriate for rural and isolated locations to prevent audible disturbances for any nearby residences.

Figure 22 - Transverse Rumble Strips at Stop Controlled Intersection (ITE)

ROUNDABOUTS

Roundabouts have become increasingly adopted across the state with drivers gaining more familiarity. Where operationally appropriate, roundabouts provide an opportunity to help slow vehicle speeds due to the deflection

[3] Safety Evaluation of Transverse Rumble Strips on Approaches to Stop-Controlled Intersections in Rural Areas (https://www.fhwa.dot.gov/publications/research/safety/hsis/12047/12047.pdf)

angles and circulating pattern. They also physically separate some of the more severe intersection related crash types, including angle, head on, and sideswipe-same.

Figure 23 - Single Lane Roundabout (FHWA)

3.3 LANE DEPARTURE

While segment related concerns were not explicitly raised during preliminary stakeholder discussions, several segment related crash types were reported more frequently in the crash data, including single motor vehicle, head on, and rear end crashes. Additionally, more fatal and incapacitating injury crashes were reported along road segments vs intersections (395 of 667 reported crashes). These crash types are often associated with lane departures as well as difficulty stopping in assured clear distances and can be particularly severe in the event of a head on crash or a single vehicle striking a fixed object. While other treatments recommended here are expected to have positive impacts on lane departure related crashes in addition to their primary focus, (i.e., distracted and impaired driver involved, wrong-way, etc.), the following treatments are targeted more specifically to lane departures. When considering fatal and incapacitating injury crashes, the following crash types shown in **Figure 24** were predominantly reported along segments versus intersections within the study area. **Figure 25** on the following page provides a high-level overview of lane departure related crashes as coded by the responding officer.

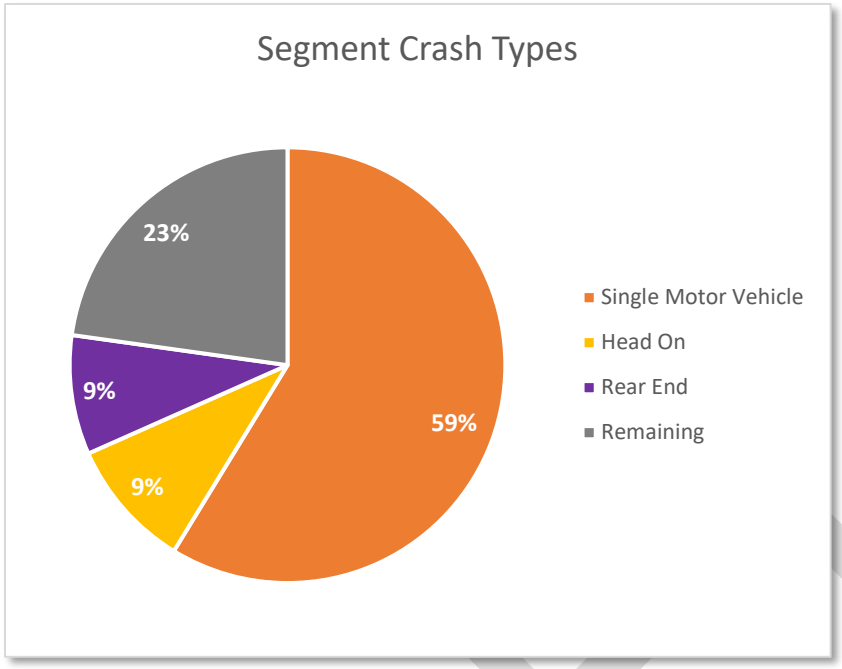


Figure 24 - Segment Crash Types

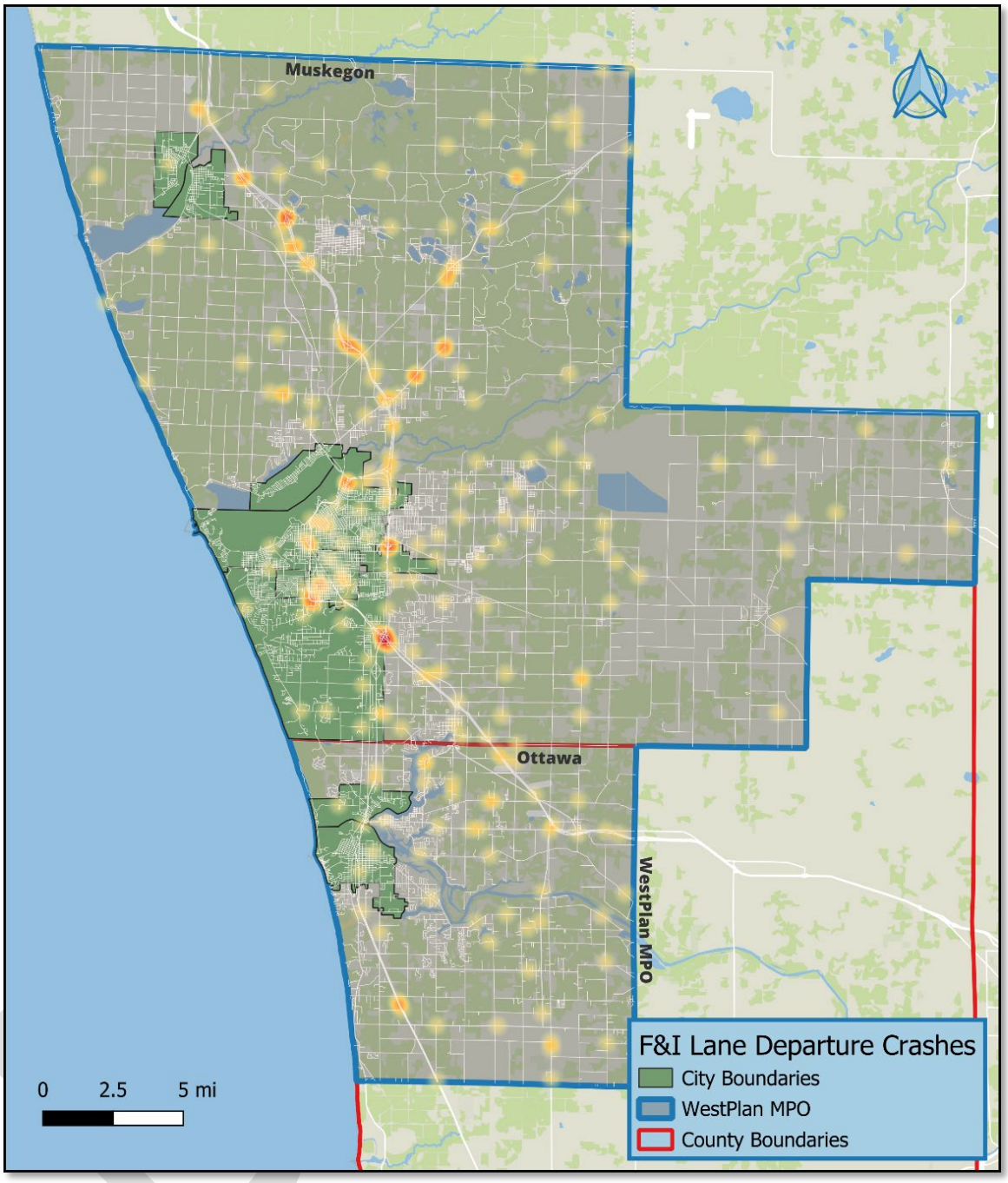


Figure 25 - Lane Departure Fatal & Incapacitating Injury Heatmap

3.3.1 STRATEGIES

ENHANCED CURVE DELINEATION

Advanced curve warning signs provide drivers with additional time to adjust their speed to prepare for the upcoming curve as needed. 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 itself, improving the driver’s ability to stay in their lane and on the road. Flashing beacons or increasingly common LED sign borders may be added to the signs to improve their conspicuity and draw drivers’ attention to the curve. Consider installing retroreflective sheeting to any curve warning or other related signposts to increase their conspicuity, particularly under nighttime or inclement weather conditions. These can be actuated for use when an approaching vehicle is detected and could be paired with other complementary delineation and other treatments.

Figure 26 - Curve Delineation (FHWA)

Figure 27 - LED Chevron Sign (PennDOT)

INSTALL OR EXPAND PAVED SHOULDERS

Paved shoulders are more stable and provide improved traction and control in comparison to gravel or other natural shoulder materials. Additionally, providing a paved shoulder surface allows for potential rumble strip installation, safety edges, and other complimentary roadside treatments. Consideration should also be given to widening existing shoulders where appropriate. This provides drivers with additional space in the event of a crash or breakdown, and as well as responding officers.

When installing new paved shoulders or sufficiently widening existing shoulders, use of a safety edge should be considered. The traditional vertical edge used in older style shoulder installations can present problems when trying to return to the shoulder or travel lane, as there is a tendency to over correct. This overcorrection can lead to sideswipe, head on, and other related crashes. Safety edges on paved roads and shoulders improves the ability of drivers who have begun to leave the roadway to return more safely. The slope of the safety edge treatment is more forgiving in allowing the vehicle to return to the roadway with less chance for overcorrecting.

Figure 28 - Safety Edge (National Center for Rural Road Safety)

REVIEW & UPDATE PASSING LANES

Travel along high-speed, rural, two-lane roads can be restricted at times when drivers begin to platoon with little opportunity for overtaking maneuvers. This can encourage drivers to take smaller gaps when passing traffic, tailgate, or otherwise express frustration. Rural segments with higher instances of sideswipe, rear end, and head on crashes should be reviewed for potential improvements to passing/no passing lane configurations. This review would also provide an opportunity to review passing and sight distance around horizontal curves with lane departure crashes. Installation of passing flares or turnouts may help to reduce driver tensions when different travel speeds are desired.

HIGH FRICTION SURFACE & OTHER SURFACE TREATMENTS

Improved friction at targeted locations experiencing lane departure and run off road crashes may benefit from improved friction profiles. This can be achieved through resurfacing or applying high friction specific surface treatments, grooving pavements, and chip sealing (among others). These improve vehicle control on the pavement and can help to reduce stopping distances. High friction surface treatments and others designed to increase pavement friction may be more effective at curve locations or intersection approaches.

Figure 29 - High Friction Surface Treatment Application (FHWA)

CENTER & EDGELINE RUMBLE STRIPS

Center and edgeline rumble strips have been shown to be effective in reducing drowsy, distracted, or otherwise impaired driver-related lane departure crashes. They provide the driver with auditory and tactile feedback when they begin to move out of their lane, alerting the driver to take corrective action when possible. These strips can be pressed into newly laid pavement or milled into existing pavement.

IMPROVED NIGHTTIME DELINEATION

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 retroreflectivity, replacing worn signs, or adding supplemental reflective delineators along the roadside. These treatments help to illuminate the road itself as well as define general alignment.

3.4 IMPAIRED DRIVER INVOLVED

Impaired driving was raised as a concern during one of the preliminary stakeholder discussions as intoxicated drivers pose a hazard to themselves and others through decreased reaction times, impaired vision, and other negative effects of intoxication. In addition to driving while intoxicated, the increasing adoption of marijuana use poses further risk that a driver may be operating while impaired. There are currently no practical roadside tests for marijuana use and other controlled substances, and as such this represents a gap in the current crash data set. Where noted by responding officers, both alcohol and drug impaired driver involved crashes have been flagged in the dataset. While impaired driver involved crashes have fluctuated over the most recent five-years of crash data

as shown in **Figure 30**, the severity of these crashes appears to be increasing slightly. Additionally, impaired driver involved crashes represent approximately 10% of all fatal and incapacitating injury crashes reported annually within the MPO. **Figure 31** on the following page provides a high-level spatial review of impaired driver involved crashes.

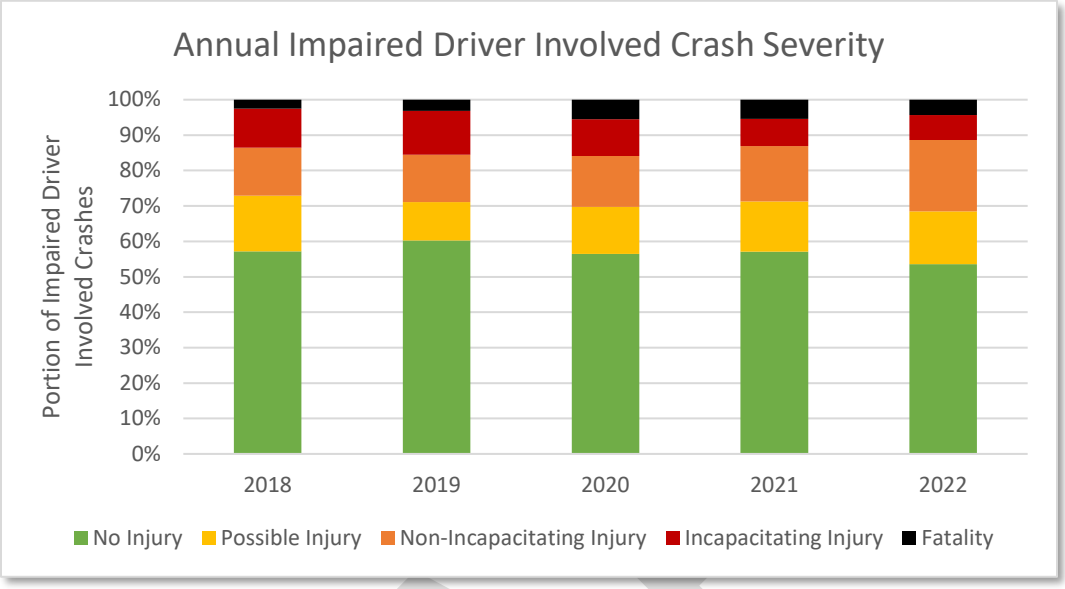


Figure 30 - WestPlan MPO Annual Severity Distribution of Impaired Driver Involved Crashes

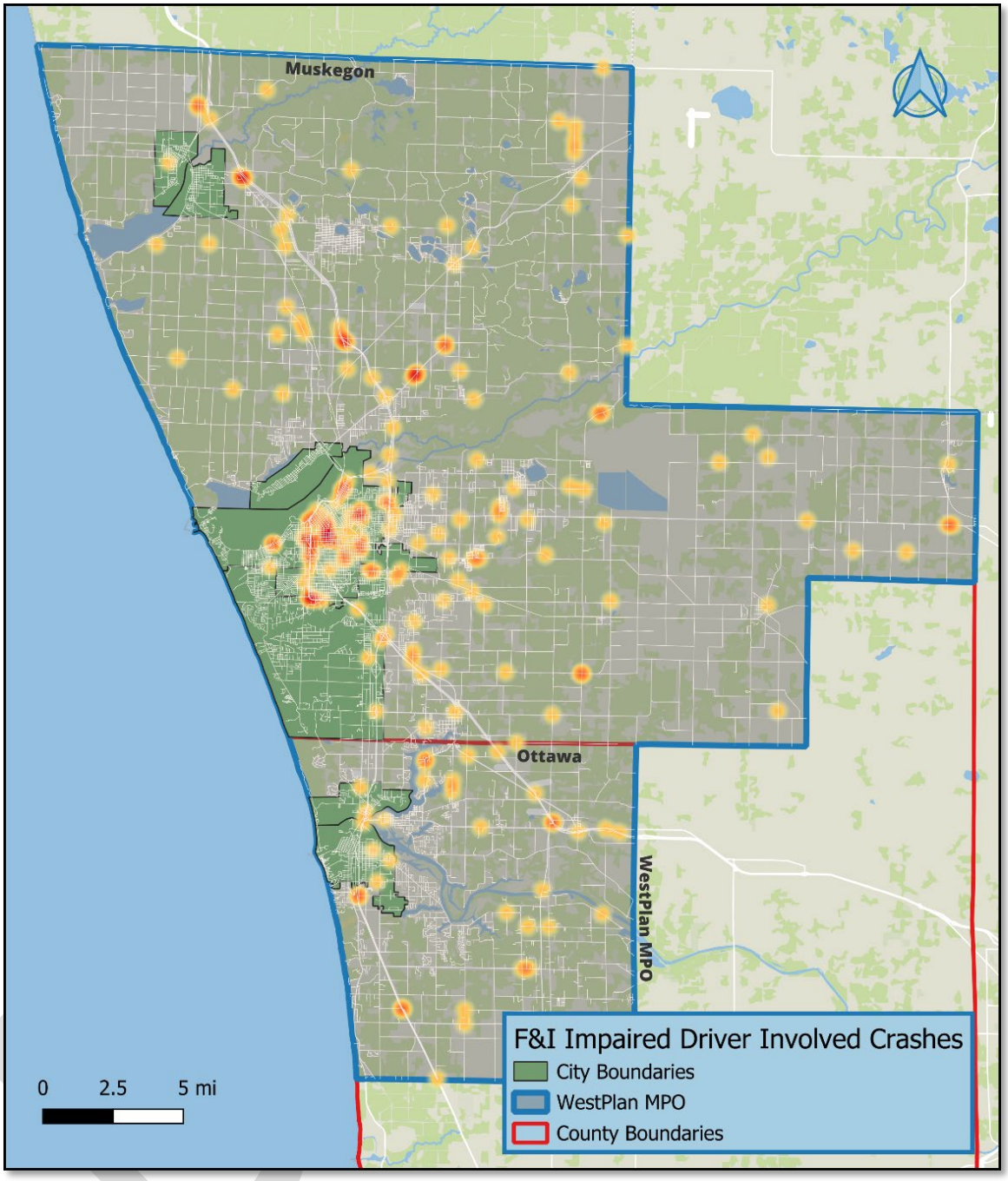


Figure 31 - Impaired Driver Involved Fatal & Incapacitating Injury Heatmap

3.4.1 STRATEGIES

TRANSIT & RIDESHARING PROGRAMS

Leverage new and existing partnerships to promote ride-sharing, particularly during peak evening and weekend periods when impaired drivers are more likely to be present. These programs could help to reduce the prevalence of impaired drivers on the transportation network. Additionally, partnerships with local transit departments and agencies could be leveraged to increase service during evening peak periods around large public or social events in the area. Coordination with local neighborhoods and communities to increase awareness and revise to address gaps or issues as they arise.

One local example includes West Michigan Rideshare administered by the Rapid, Grand Rapids public transit system operator. The program includes ride sharing coordination and support for bikes, and carpools, vanpools, and employer services, among others. The current service area is centered around Grand Rapids and serves Kent, Ottawa, and Allegan Counties, which are focused on commuting trips.

Figure 32 - Local Rideshare Example

DRUG RECOGNITION EXPERT (DRE) TRAINING

Included under the previous WMSRDC RTSP for its importance, Operating While Intoxicated (OWI) Enforcement Training, the Standardized Field Sobriety Testing Program (SFST), Advanced Roadside Impaired Driving Enforcement Program (ARIDE), and Drug Recognition Expert program (DRE) encompass many aspects of law enforcement training pertaining to recognition and deterrence of impaired driving. Officers across the MPO have already received training in these programs and are encouraged to continue training new officers. The relatively recent legalization of marijuana continues to impact communities and reinforces the need for refresher training and other opportunities for updates to best practice in this space.

HIGH VISIBILITY ENFORCEMENT CAMPAIGNS

Included under the previous WMSRDC RTSP and repeated here for its importance; high visibility enforcement campaigns help to both encourage drivers to plan ahead before an evening out, as well as increase officer presence to actively identify and remove impaired drivers from the network. High visibility campaigns could be coordinated with local education and outreach efforts and provide an opportunity to partner with communities and neighborhoods to work together towards encouraging safer driver behaviors for all road users.

EDUCATION & TREATMENT AWARENESS CAMPAIGN

Education campaigns often focus on the end result of impaired driver involved crashes. While this is critical to raising and maintaining awareness around the issue and encouraging safer driver behavior, education around available treatment and rehabilitation programs may help steer individuals toward resources for help. Both aspects should be considered when developing any education programs and coordinated with the communities themselves.

Educational efforts could be paired with connections to related public health and social services to connect individuals more directly to any needed assistance.

3.5 DRIVER BEHAVIOR RELATED

The Safe System approach is designed to bring a comprehensive approach to road safety, including safe road users and safe speeds. During discussions with stakeholders, anecdotal instances of increased speeds, drivers failing to yield, and distracted drivers were noted. **Figure 33** provides the distribution of crash outcomes by hazardous actions cited by responding law enforcement. It should be noted that most crashes included flags under several categories listed below. As such the total number under each category will exceed the number of individual reported crashes.

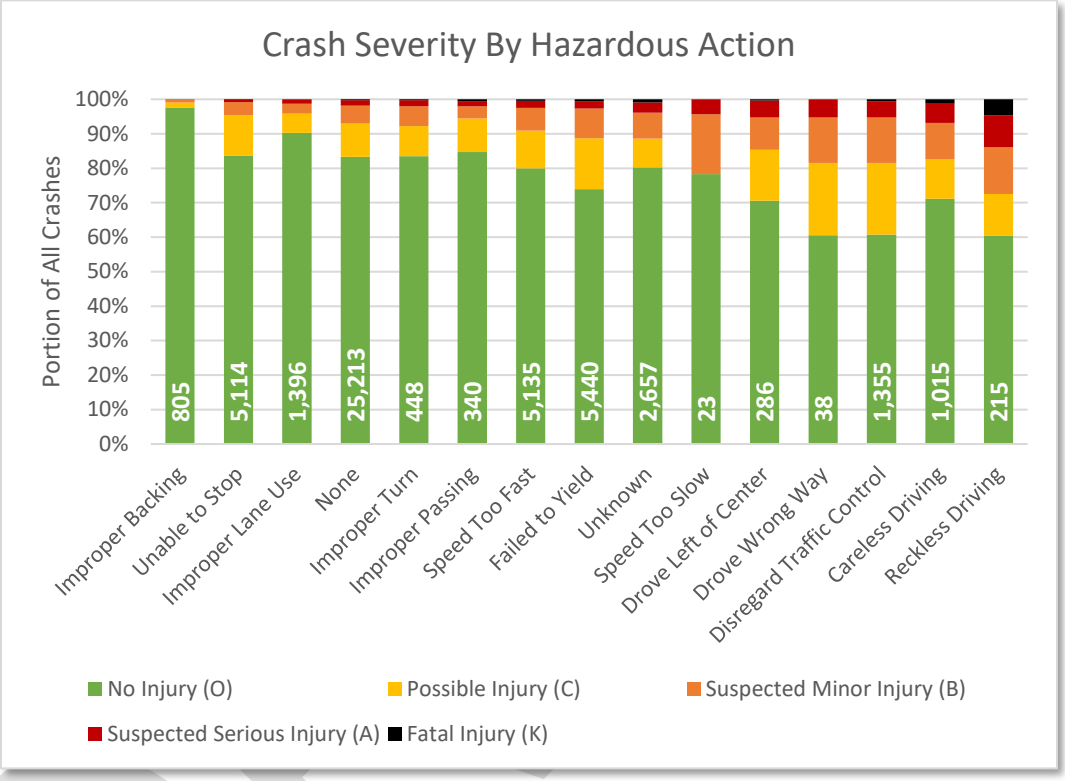


Figure 33 - Crash Severity by Cited Hazardous Action

Based on these anecdotes and a review of available crash data for the MPO, the following driver behaviors and hazardous actions were identified. **Figure 34** on the following page provides a high-level spatial review of driver behavior related crashes. Disregarding Traffic Control, Lane Departure, and Wrong-Way Driving will be included under other Emphasis Areas.

- Reckless & Careless Driving,
- Disregarding Traffic Control,
- Lane Departure,
- Wrong-Way Driving,
- Failure to Yield, and;
- Speeding.

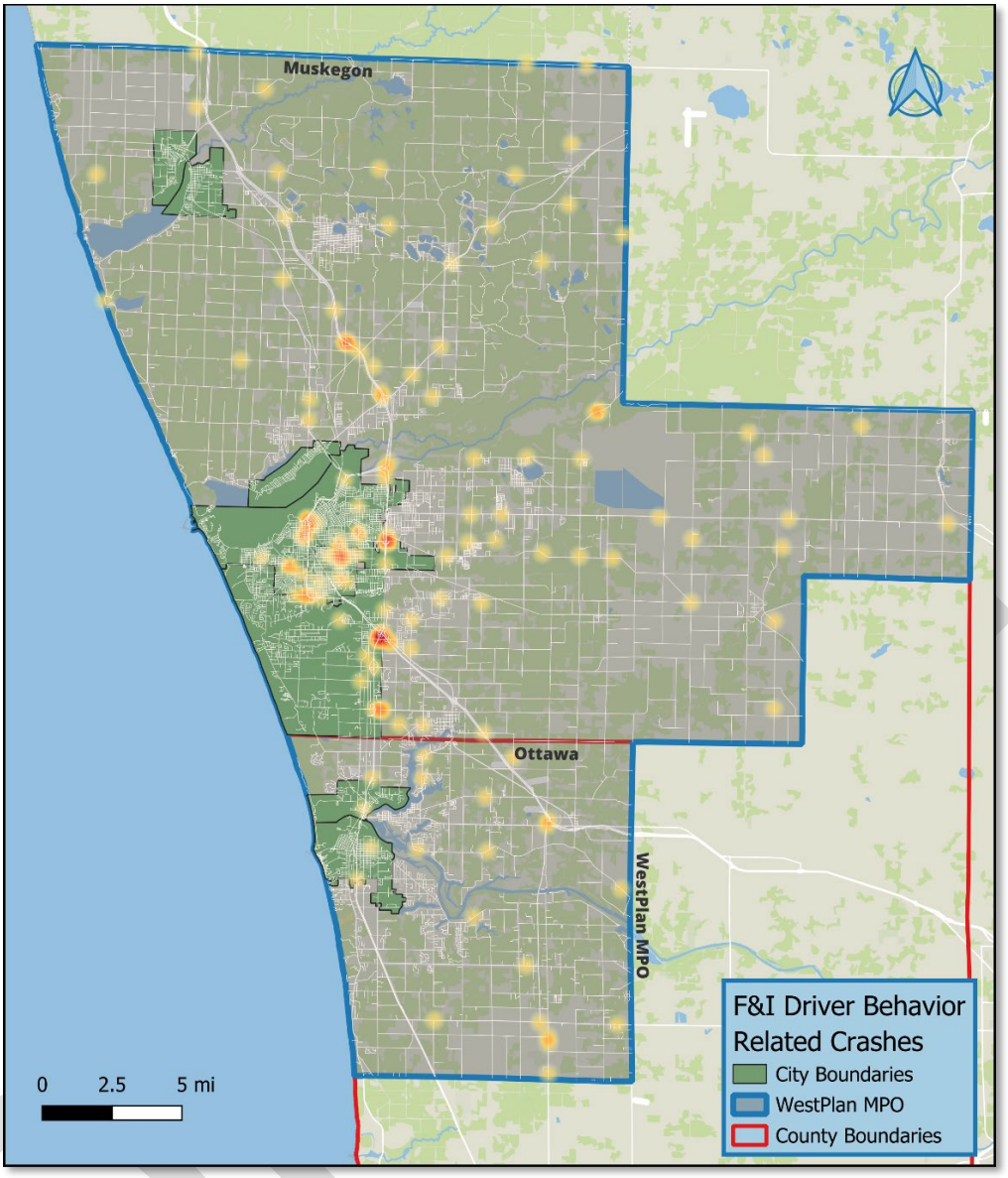


Figure 34 - Driver Behavior Related Fatal & Incapacitating Injury Heatmap

Increased speeds generally raise the potential for more severe crashes, particularly when considering vulnerable road users. This is because the higher speeds lead to increased energy transfer which exceeds the tolerances that the human body is able to withstand. Vulnerable road users typically include pedestrians, bicyclists, individuals using assistive devices, and other methods of transportation, like motorcycles, that offer less physical protection than an enclosed motor vehicle. Controlling or encouraging lower overall speeds will help to protect this population as well, with additional equity analysis and community feedback to help identify critical locations on the network.

In addition to speed related concerns, several hazardous actions were noted as contributing to more severe crash outcomes. While some of these are expected to be treated under this Emphasis Area, others may fall under different categories, such as disregarding traffic control, lane departures, and wrong-way driving incidents.

In working toward zero fatalities and incapacitating injury crashes, encouraging lower travel speeds through various means (roadway geometry, signing, education, etc.) is expected to help reduce the severity of crashes by reducing the level of kinetic energy involved in the crash. Additionally, distracted driving or driving while using a cell phone

was raised in discussions with stakeholders and generally supported in the crash data. These behaviors, in addition to the hazardous actions identified above, are considered under this Emphasis Area.

3.5.1 STRATEGIES

AUTOMATED ENFORCEMENT

The State of Michigan is exploring the potential use of automated speed enforcement in active construction work zones. While the use of this technology is still pending approval by the State Legislature and Governor, implementation of such systems should be considered to help reduce travel speeds through work zones and help to protect construction and other on-site personnel.

The intent of the automated speed enforcement system is to lower travel speeds through work zones without requiring traffic stops within the work zone. Based on current proposed legislation, cameras would identify license plates at the start and end of the work zone to determine average travel speeds. License plates flagged exceeding 10mph over the work zone limit will receive a written volitation for the first offense, with increasing penalties for future occurrences.

MOBILE & FIXED SPEED FEEDBACK SIGNS

Included under the previous WMSRDC RTSP, speed feedback signs are a relatively low-cost low effort treatment that can be used to encourage drivers to stay within the posted speed limit. These may be permanent installations or mobile speed feedback sign trailers which can be relocated as needed. The feedback systems detect and display the speed of the oncoming vehicle via radar detection and are paired with supplemental speed limit signs. This provides the driver with real-time feedback and reinforces the speed limit. Permanent installations have also been used in areas with higher prevalence of vulnerable road users, such as reduced school speed zones, residential roads, or other non-motorized road user generators like parks. Additionally, some studies have shown positive impacts when installing speed feedback signs at the approach to significant curves in the roadway.

Figure 35 - Dynamic Speed Feedback Sign at Curve (FHWA)

ROAD DIETS & COMPLETE STREETS

Drivers tend to operate based on how they feel traveling along the roadway based in part on the roadway geometry, surrounding land use, and the local traffic mix. This tends to apply primarily to travel speeds, but may also influence lane keeping, navigation, and other driving tasks. Some approaches to help with space-making include consideration of Road Diets and Complete Street design approaches. Both approaches provide maintaining agencies an opportunity to repurpose existing infrastructure to serve road users of all types more equitably.

Road diets reduce the number of thru travel lanes along a corridor, typically by repurposing lane use within existing pavement footprints. A typical example is the conversion of an existing four-lane segment with two travel lanes in each direction to a three-lane cross-section with a center two way left turn lane. In this example, left turning vehicles are removed from travel lanes improving operations, while supporting travel speed reductions by providing the opportunity to narrow travel lanes through the addition of on street parking and/or bicycle lanes. This type of treatment should only be applied where traffic volumes and an operational analysis support feasibility.

Complete Streets looks at a corridor segment to reimagine it as a more welcoming space for travel modes of all types, both motorized and non-motorized. This approach prioritizes road user safety over vehicle speed and volume throughputs and can be an opportunity for community involvement and local space making efforts in addition to safety enhancements. Some examples of related treatments include:

- Enhanced pedestrian crossings (Enhanced Pavement Markings, Rectangular Rapid Flashing Beacon, High-Intensity Activated Crosswalk, etc.)
- Installing/Enhancing Bicycle Lanes
- Dynamic speed feedback signs

Similarly with Road Diets, an operational analysis would be necessary before implementation, but when appropriately applied these and other complementary treatments can help to create an environment that safely encourages lower speeds and greater public access to the right of way.

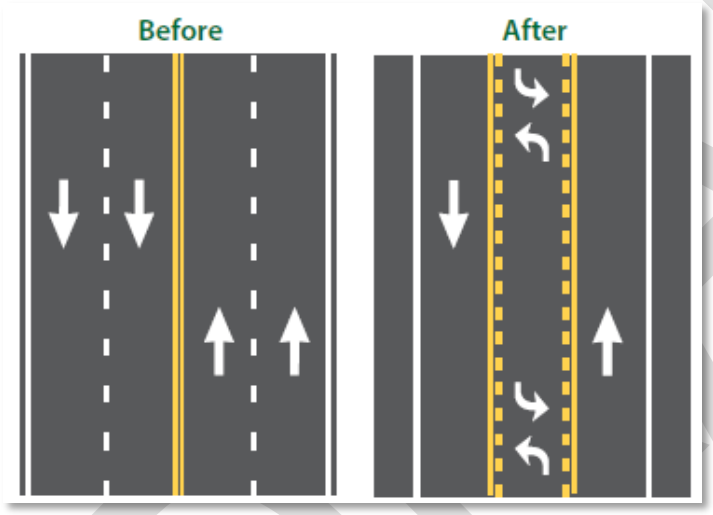


Figure 36 - Road Diet Example (FHWA)

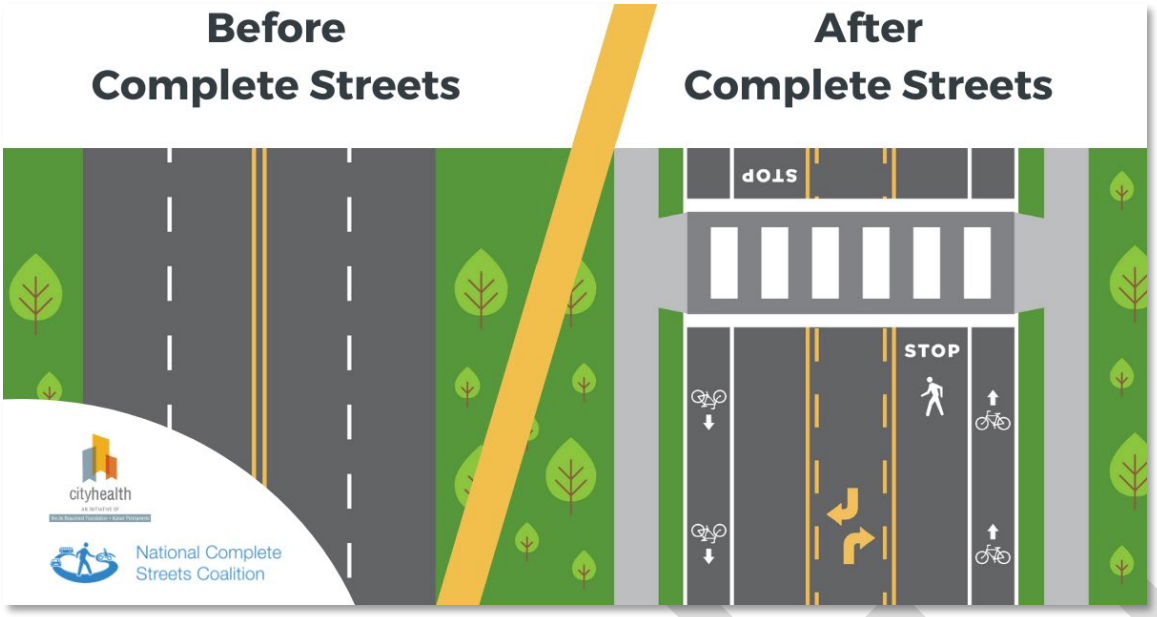


Figure 37 - Complete Streets Example (National Complete Streets Coalition)

TRAFFIC CALMING PROJECTS

Several methods exist to help encourage lower traffic speeds in lower volume areas. These are often employed on lower volume roads and are intended to lower traffic speeds and discourage improper cut-through traffic. Below is a list of typical traffic calming projects, many of which could be incorporated in varying combinations depending on constraints and site need.

As noted in **Table 6** below, the vertical and horizontal displacement imposed by these treatments are intended to encourage decreased travel speeds and increased awareness of potential vulnerable road users in the area. Raised crosswalks and intersections provide opportunities to make crossings more conspicuous while also slowing driver speeds. Other treatments such as chicanes and curb bump-outs are intended to safely restrict lateral space while also encouraging lower speeds. These could be alternatively used to shorten the required crossing distance for non-motorized road users.

Table 6 - Traffic Calming Examples by Displacement

Vertical Displacement	Horizontal Displacement
• Raised Intersection • Raised Crosswalk • Speed Tables/Humps	• Gateway Treatments • On-Street Parking • Widen Sidewalk • Sidewalk/Curb Bump-Outs • Chicanes • Roundabouts • Diverting Islands / Raised Medians • Tight Corner Radii

Figure 38 - Traffic Calming Examples (FHWA)

DISTRACTED DRIVER EDUCATION CAMPAIGN

As of June 1st, 2023, Michigan enacted a ban on manual cell phone use while driving. This means that any physical interaction beyond a single touch with a phone is prohibited. Fines are issued for the first two offenses with the 3rd offense resulting in required attendance of a driving improvement course. The law was passed to help reduce distracted driver-involved crashes. While the full impact of this law will take time to develop, it provides an opportunity to raise awareness about the new law as well as remind drivers of the dangers of distracted driving.

Enforcement campaigns should be preceded by education and awareness efforts to help inform the general public of concerns and any safety efforts targeting them. Education and Enforcement campaigns could be targeted in areas with more vulnerable road users or higher instances of distracted driver related observations. Consideration should be given to the specific means and methods for communication and tailor them based on the target audience.

3.6 MOTORCYCLE INVOLVED

Motorcycle crashes were identified as a potential area of concern through discussions with stakeholders. This vehicle type presents different challenges and opportunities as it combines the motorized speed of a passenger car with the open-air nature of a pedal bicycle. Due to these and other factors, motorcycle crashes tend to result in more severe outcomes. **Figure 39** provides a basic heatmap showing motorcycle-involved crashes that resulted in fatal or incapacitating injury crashes, which illustrates the widespread nature of this smaller subset of crashes.

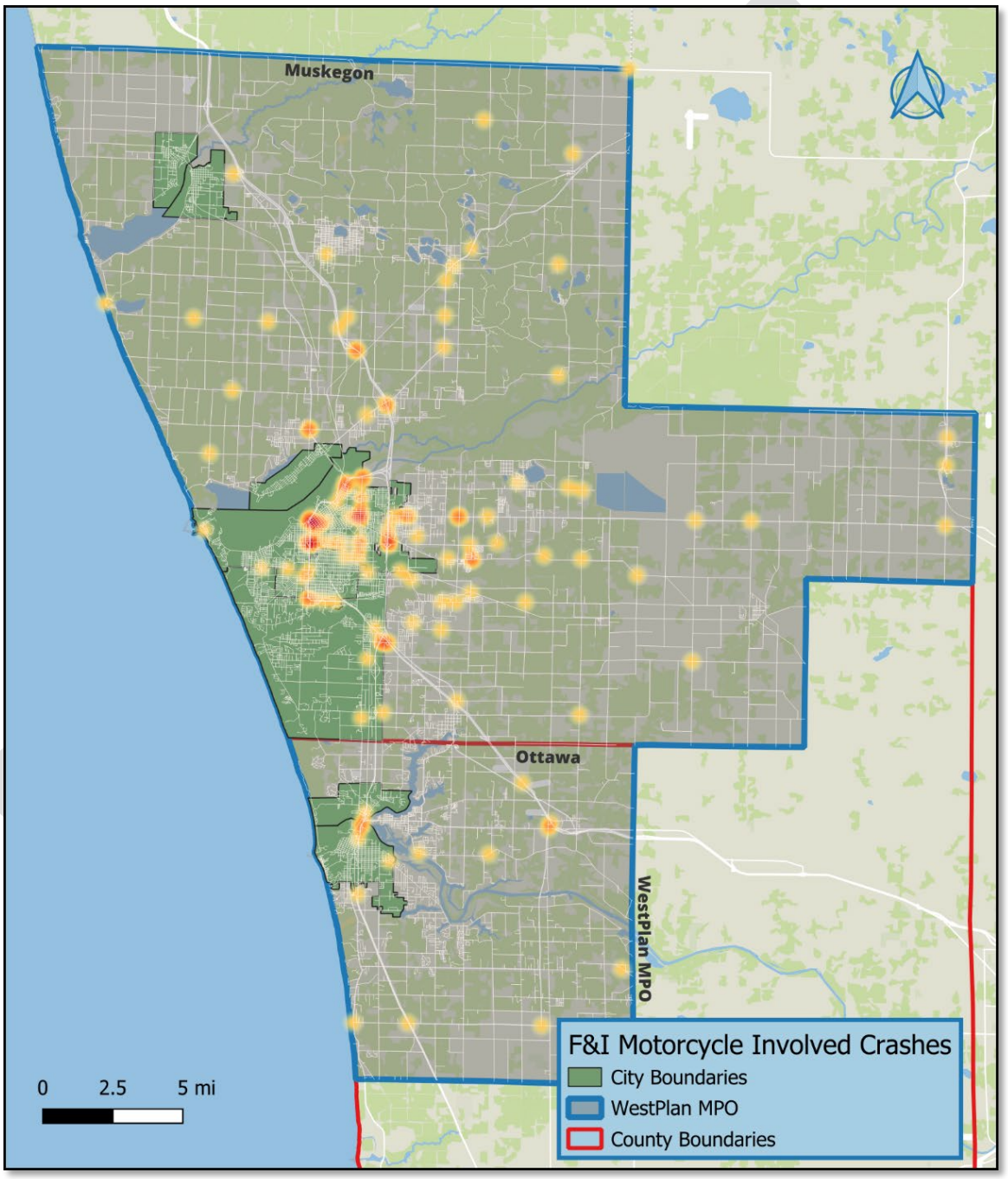


Figure 39 - Motorcycle Involved Fatal & Incapacitating Injury Heatmap

When considering motorcycle involved crashes resulting in incapacitating injuries or fatalities, single motor vehicle, angle, head on, and rear end crashes account for the most frequently cited crash types. **Figure 40** provides the distribution of these crash types, with single motor vehicle motorcycle crashes accounting for more than a third of these crashes.

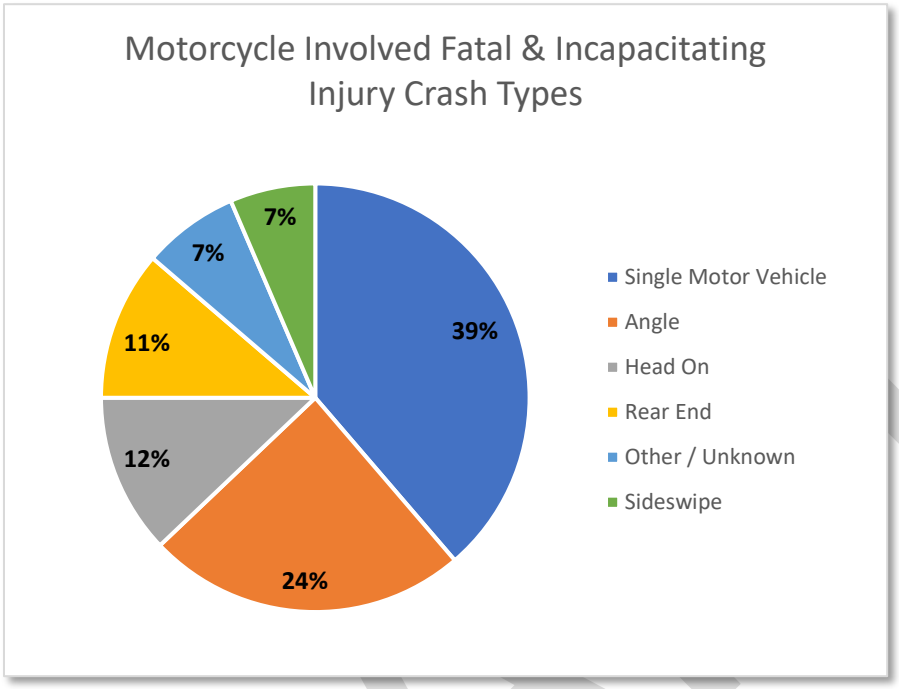


Figure 40 - Crash Type for Motorcycle Involved Crashes

3.6.1 STRATEGIES

EDUCATION CAMPAIGNS

Given the vastly different performance profiles of enclosed motor vehicles and motorcycles, reminders to all parties regarding safe driver behaviors are important. Well-known education campaigns exist to remind drivers to stay aware of motorcycles on the road and to watch their blind spots. As motorcycles take up less space than standard vehicles and make up a much smaller portion of the vehicle mix, it can be easier to miss them. These reminders are an important part of encouraging safe driver behaviors and active navigation and guidance tasks.

When considering fatal and incapacitating injury crashes involving motorcyclists, more than a third involved only the motorcyclists. Encouraging motorcycle refresher training and supporting widespread helmet use are two potential areas for education campaigns targeted at motorcycle riders. Recommendations regarding protective gear and the use of high visibility rider apparel would also help riders stand out under varying environmental conditions.

ENFORCEMENT CAMPAIGNS

Targeted enforcement campaigns should be considered to highlight areas of higher instances of motorcycle-involved crashes. This could be paired with an ongoing education campaign as appropriate. These efforts would help to remind drivers and riders of their collective responsibility when sharing the road and serve as a high visibility deterrent.

MOTORCYCLE FOCUSED EMERGENCY RESONSE TRAINING

Given the unique nature of motorcycles and associated crashes, there are several injuries that tend to be more typical for motorcycle involved crashes. Training courses which cover response methods for both bystanders and first responders includes P.A.C.T. (Prevent Further Injury, Assess the Situation, Contact EMS, and Treat the Injured with Life Sustaining Care) and could be promoted for emergency responders, as well as the general public interested in enhancing first aid training and other safety preparations.

3.7 VULNERABLE ROAD USER INVOLVED

Concerns regarding the safety of vulnerable road users were raised during preliminary stakeholder discussions; some examples include concerns regarding transit station access, amenities, and wayfinding. Due to the unprotected nature of vulnerable road users, crashes more frequently result in incapacitating injuries or fatalities. The Safe System Approach broadens the typical definition of vulnerable road users from specifically pedestrian, bicyclist, and other non-motorized road users to include those in underserved or disadvantaged communities. While some aspects of this emphasis area are readily available within the crash data, additional demographic datasets help to guide implementation of potential safety treatments.

When comparing the severity distribution of crashes of these types against the full set of crashes reported within the study area, a significant trend toward more severe crash results emerges. **Figure 41** provides this comparison showing a greater prevalence of confirmed injury crashes or fatalities when considering vulnerable road users specifically.

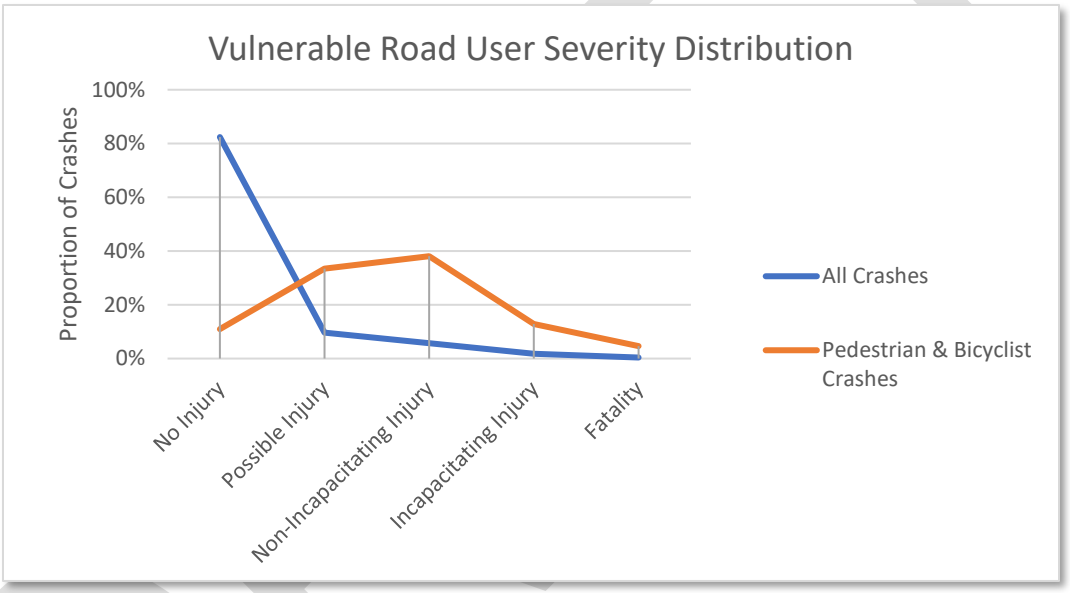


Figure 41 - WestPlan MPO Vulnerable Road User Severity Distribution (2018 - 2022)

While vulnerable road users generally utilize all portions of the transportation network, and when considering these crashes by segment vs intersection areas, bicycle involved crashes were more likely to occur at intersections than segments (62% vs 38%) while pedestrians where more likely to be involved in a crash along a road segment (74% vs 26%). Additional considerations that may impact vulnerable road user safety in a more pronounced way include presence of non-motorized paths/sidewalks, pedestrian scale lighting, proximity to amenities and traffic generators, etc. **Figure 42** provide a high-level review of vulnerable road user involved in fatal and incapacitating injury crashes.

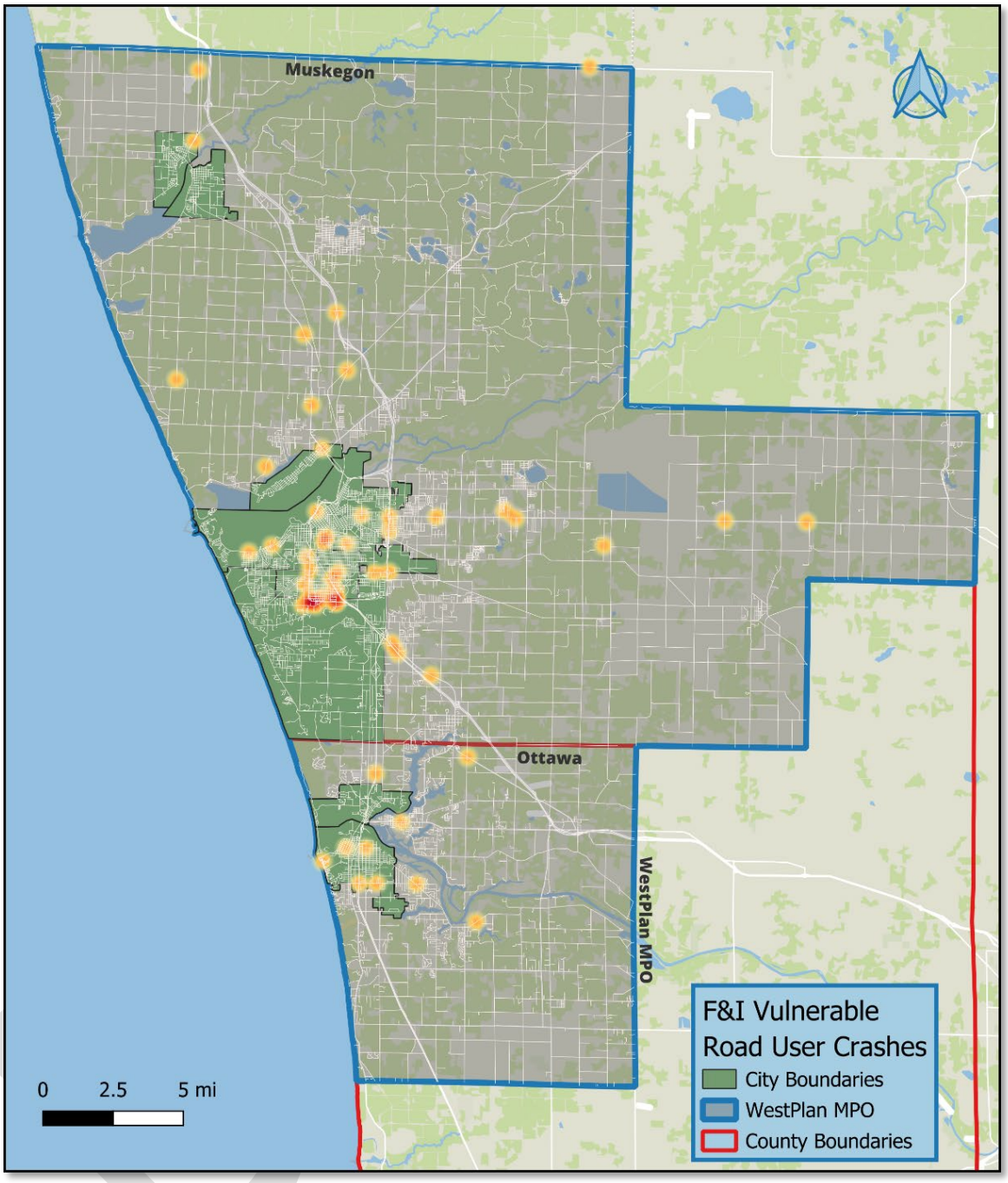


Figure 42 – Vulnerable Road User Involved Fatal & Incapacitating Injury Heatmap

3.7.1 STRATEGIES

TRANSIT ACCESS

Public transit provides a community-based transportation service to provide greater access for road users who may not have access to a motorized vehicle. Public transit services include both Fixed Route (i.e., routine bus service) and On Demand / As Needed pick up options available depending on local services. Transit stops are necessary for both modes of travel and should provide safe waiting areas for transit riders.

Transit stops typically vary widely in terms of amenities offered – ranging from a single bus stop sign mounted by the sidewalk to partially enclosed waiting areas and benches with real time transit information displayed via screen. Additionally, some transit stops provide sidewalk access while others require riders to traverse turf areas. While this may be workable during the dry summer months, turf areas can be difficult for pedestrians and individuals using assistive devices to navigate. Similarly, transit stops without a seating area or bench may be physically challenging for some individuals to use.

Partnering with local transit agencies and public transit operators to identify opportunities to improve or expand upon existing infrastructure may help:

- Provide ADA accessible transit stops,
- Provide shelters from inclement weather,
- Improve transit stop/route wayfinding (sign enhancements, accurate real-time transit status, etc.)
- Review and update transit stop locations to fill gaps in service or relocate as needed.

One local example includes West Michigan Rideshare administered by the Rapid, Grand Rapids public transit system operator. The program includes ride sharing coordination and support for bikes, carpools, vanpools, and employer services, among others. The current service area is centered around Grand Rapids and serves Kent, Ottawa, and Allegan Counties and focuses on commuting trips. While these treatments may not be directly tied to reductions in fatal and incapacitating injury crashes, improved transit access may help to encourage increased ridership and shift some vulnerable road users from the roadside to the bus stop.

Figure 43 – Partially Enclosed Bus Shelter (FHWA)

CROSSWALK IMPROVEMENTS

Installation of a range of crosswalk improvements would benefit pedestrians and bicyclists and provide greater, and purposeful, delineation to drivers. Marked crossings provide a defined space for vulnerable road users to cross motorized traffic, both at intersections and midblock. This infrastructure helps to guide non-motorized road users as well as alerting drivers of the potential presence of pedestrians or bicyclists in the area. Some examples of crossing improvements include, but are not limited to:

- Enhanced Pedestrian Crossing Pavement Markings,
- Advanced and at Crossing Signage,
- Street & Pedestrian-Level Lighting,
- Rapid Rectangular Flashing Beacon (RRFB),
- High-Intensity Actuated Crosswalk (HAWK),
- Pedestrian Countdown Timers & Pushbutton Actuation (Signalized Only),
- Leading Pedestrian Phase (Signalized Only),
- Curb Bump Outs, and
- Raised Crossing Table.

Figure 44 - Rectangular Rapid Flashing Beacon (RRFB) (FHWA)

SIDEWALK & MULTI-USE TRAIL CONNECTIVITY

Efforts to build out existing non-motorized infrastructure have increased over the preceeding decade as municipalities embrace the diversity of tranist modes and space making opportunities. A connected and maintained non-motorized network helps to reduce the number of motorized vehicles on the roadway while idealy providing road users with a viable alternative to motor vehicle-based travel. This can also be promoted to improve overall community health by encouraging walking and bicycling where feasible. This trail network may be supplemented through roadway bike lanes and sharrows where appropriate. Consideration should be given to reviewing and updating any non-motorized plans to identify existing gaps and future priorities, including supporting underserved communities.

In addition to completing physical gaps in the network, consider reviewing existing non-motorized infrastructure to identify potential locations for improvement, including but not limited to:

- Sign and delineate non-motorized trail crossings,
- Widening narrow sidewalk segments,
- Reducing or eliminating trip hazards,
- Ensuring pedestrians and those using assistive devices have sufficient room to turn and maneuver along sidewalk routes, and;
- Providing level landings and ADA ramps at pushbutton locations.

Figure 45 - Enhanced Trail Crossing (FHWA)

BIKE LANES & SHARROWS

As previously mentioned, in road bike lanes (in situ and physically buffered) and sharrows help to provide dedicated space for bicyclists. While physically buffered bike lanes are typically preferred to increase separation between modes of travel, painted bike lanes and sharrows can help to increase driver awareness of non-motorized road users sharing the space.

While these treatments have been used relatively widely, additional education and public awareness programs regarding the lanes and appropriate use should also be considered, particularly in areas where new bike lanes or other facilities are being installed.

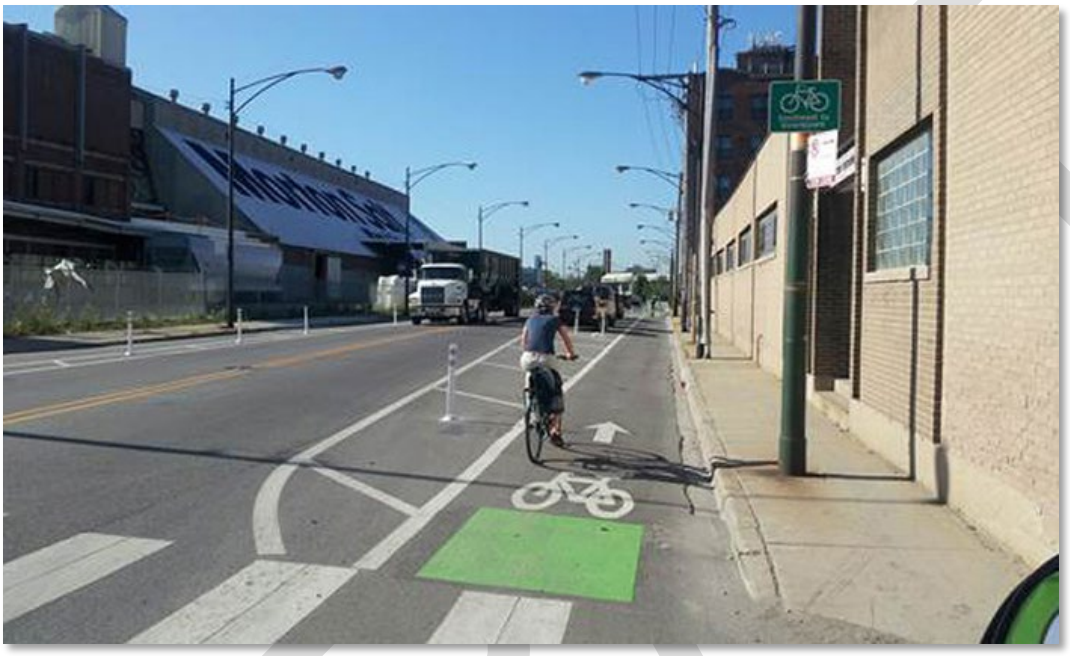


Figure 46 - Buffered Bike Lane (FHWA)

REDUCE LIGHTING GAPS

Non-motorized road users are more vulnerable when sharing the road with motorized vehicles, particularly under dark lighting conditions. While some bicyclists may attach reflective and/or active beacons to their bikes to help them stand out at night, many do not. Additionally, pedestrians typically do not wear reflective clothing or other lighting at night, making it more difficult to see them under dark conditions.

An additional consideration is the type of lighting present. While higher roadway lighting is helpful for broader geometric features and pavement markings, it provides less consistent coverage at the pedestrian and sidewalk level in many instances. A review of the non-motorized network and typical walking routes should be reviewed under dark conditions to identify and fill coverage gaps as feasible. Sufficient lighting helps drivers and non-motorized users to identify each other and more safely share space.

COMMUNITY EDUCATION & AWARENESS PROGRAMS

Any changes to the non-motorized network in the area may provide a good opportunity to increase or refresh the general public's understanding of the network and how to navigate it. Updating local navigation maps and wayfinding, educating younger students about the rules of the crossing and safe behaviors, supporting and / or starting Safe Routes to Schools (SR2S)[4] events and Walking School Buses[5] are all examples of efforts and programs that may prove beneficial.

This is particularly important when working with younger children and teaching them the proper and safe ways to share the road with other users. Educating students on the rules of the road and their shared role in traveling safely provides an opportunity for collaborative safety efforts. It could be paired with distribution of reflective badges or other devices to help illuminate/delineate for backpacks, bicycles, etc. In addition to promoting safe use of the network, these programs may also help to promote healthy, active lifestyles through walking and biking to school or work.

Other education and awareness programs could be implemented to assist middle and high school students as well as adults. Bicyclists sharing the road with vehicles should be versed in the rules of the road and their responsibilities while sharing the space. Offering educational materials or programs that may overlap slightly could improve the mutual understanding of both groups, resulting in more equitable and safer road sharing behaviors.

[4] Michigan Safe Routes to School (http://saferoutesmichigan.org/)
[5] Walking School Bus Resource (http://www.walkingschoolbus.org/)

3.8 WRONG-WAY DRIVING

During preliminary stakeholder discussions, concerns regarding wrong-way driving incidents were noted. This concern includes wrong-way driving maneuvers in general, but also related to the transition between roadway functional class. This is an important consideration for the MPO as it includes transitions from full access to limited access freeways, as well as some interchange configurations which may benefit from reconfiguration or other treatments.

While there is an attribute in the crash data for Wrong-Way Driving, this action is expected to be undercounted due largely to the nature of wrong-way crashes. Despite the relatively infrequent occurrence of wrong-way driving crashes, they often result in significant injuries or fatalities and represent unique challenges for responding officers. By their nature, wrong-way crashes typically originate at an unknown location that may be far and away from the final crash location. This can make it somewhat difficult to respond to specific incidents with specific treatments.

Characteristics that may lend themselves more readily to wrong-way driving crashes have been identified through large studies by the National Cooperative Highway Research Program (NCHRP) and others. This can be used to systematically identify candidate project locations and focus wrong-way driving safety treatments. **Figure 47** provides an example of one type of ramp alignment that may benefit from wrong-way driving related treatments. The paired nature of the on- and off- ramp at this location increases the potential for a driver to err when turning on to US-31. Several treatments have been identified which help to mitigate these scenarios, including supplemental signage, enhanced pavement markings, geometric updates, and emerging ITS technologies designed to identify wrong-way maneuvers and alert local traffic (changeable message signs, radio, etc.), maintaining agencies, and local law enforcement to support responses.

Figure 47 - US-31 & White Lake Dr - Paired On/Off-Ramp Example

3.8.1 STRATEGIES

SIGNING & PAVEMENT MARKING ENHANCEMENTS

Drivers take in information about their surroundings in different ways, with signs and pavement markings being some of the most fundamental indicators when navigating the transportation network. Even locations where preventative measures, like wrong-way signing or other treatments have been applied may benefit from further enhancements. Some examples of signing and pavement marking treatments for wrong way drivers include, but are not limited to:

- Refresh signs to improve retroreflectivity / nighttime visibility,
- Reflectorize sign supports,
- Increase sign size,
- Add supplemental “Do Not Enter” signs;
    - Consider a lower mounting height where appropriate to place signs more directly in the line of sight for potential wrong-way drivers.
- Review and realign signs as needed to improve visibility,
- Upgrade to LED activated signs (see ITS Strategies),
- In-Lane Lane Use Pavement Marking Arrows and/or Route Shields, and;
- Upgrade to nighttime/wet reflective pavement markings.

Figure 48 - Lower Mounting Height for Wrong Way Driving Signs (Caltrans)

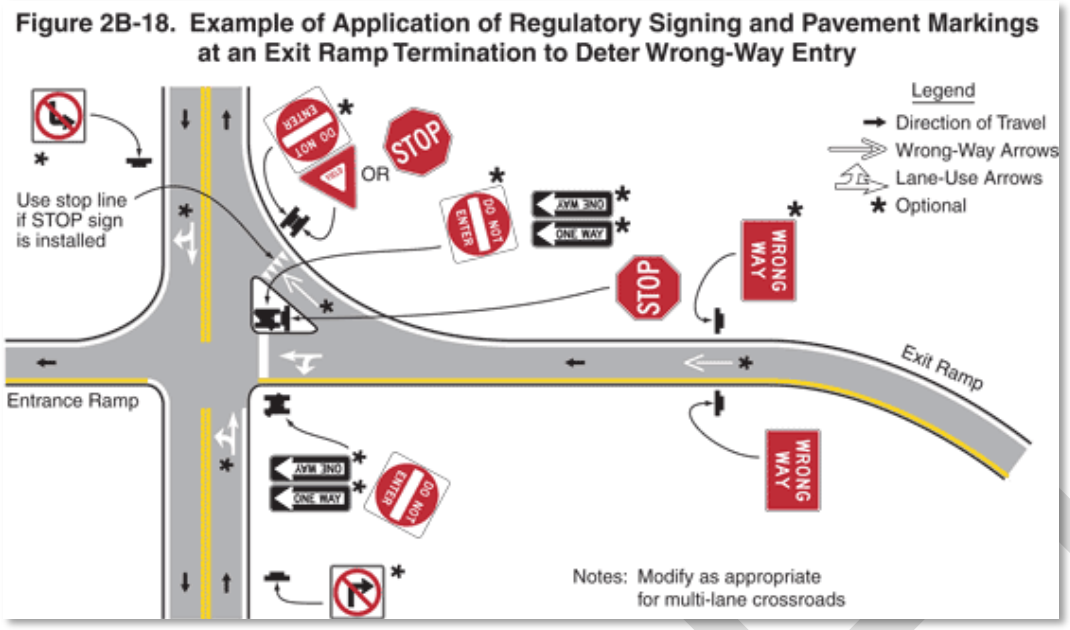


Figure 49 - MUTCD Example Wrong-Way Deterrence Signing (FHWA)

GEOMETRIC ENHANCEMENTS

Geometric features play a significant role in transportation safety and can be used to encourage safer driving behaviors. Wrong-way driving treatments regarding geometric changes tend to focus on interchange and ramp terminals, but more focused enhancements can be employed at surface street locations as well. These strategies are intended to discourage wrong-way maneuvers and reinforce intended lane use, turning movements, etc. and can generally be deployed systematically based on site characteristics. Some examples of geometric treatments and considerations for wrong-way drivers includes:

- General/Surface Street Focused
  - Directional rumble strips
  - Raised Median (Adding or Revising Openings)
  - Channelizing (Island & Longitudinal)
  - Reduce/eliminate radii to discourage wrong-way turns
- Interchange Focused
  - Increase distance between on- and off-ramp terminals
  - Increase on-ramp throat opening and reduce off-ramp throat opening
  - Consider Roundabouts, Diverging Diamond Interchanges, and other Interchange configurations that physically constrict turn maneuvers

LIGHTING & DELINEATION

Wrong-way driving crashes tend to occur under dark, unlit conditions, inclement weather, or otherwise sight distance limited circumstances. This makes it less likely that a driver may notice advanced warning signs, pavement markings, or other geometric features indicating changing conditions ahead. Some example treatments to help reduce the potential for wrong way driving crashes include:

- Install / Improve Lighting
- Install Nighttime / Wet Reflective Pavement Markings
- Install Barrier Delineators (reflect red when viewed from the wrong direction)

Figure 50 - Wrong Way Barrier Delineators (FHWA)

ITS & SIGNAL TREATMENTS

Intelligent Transportation Systems (ITS) and traffic signals provide tools and opportunities to help deter, mitigate, and respond to potential wrong way maneuvers. ITS solutions in this space typically consist of some form of vehicular detection designed to identify potential wrong-way maneuvers. The system can then activate local warning signs and lights to alert the driver on-site, while also sending an alert to local law enforcement, roadway maintaining agencies, and the public to warn of potential wrong-way drivers in the area. This helps to prime other motorists to be on the lookout and alerts law enforcement and maintenance officials to track and respond to the incident.

Depending on the site specifics, existing traffic signals may provide locations and structures to support aspects of these ITS wrong-way driving systems. Additionally, use of directional arrow lenses in traffic signals to provide positive guidance for certain movements (i.e., Right Green Arrow for right turn only movement vs a standard Green Ball) have been shown to improve driver navigation.

Figure 51 - LED Wrong Way Sign Installation (FHWA)

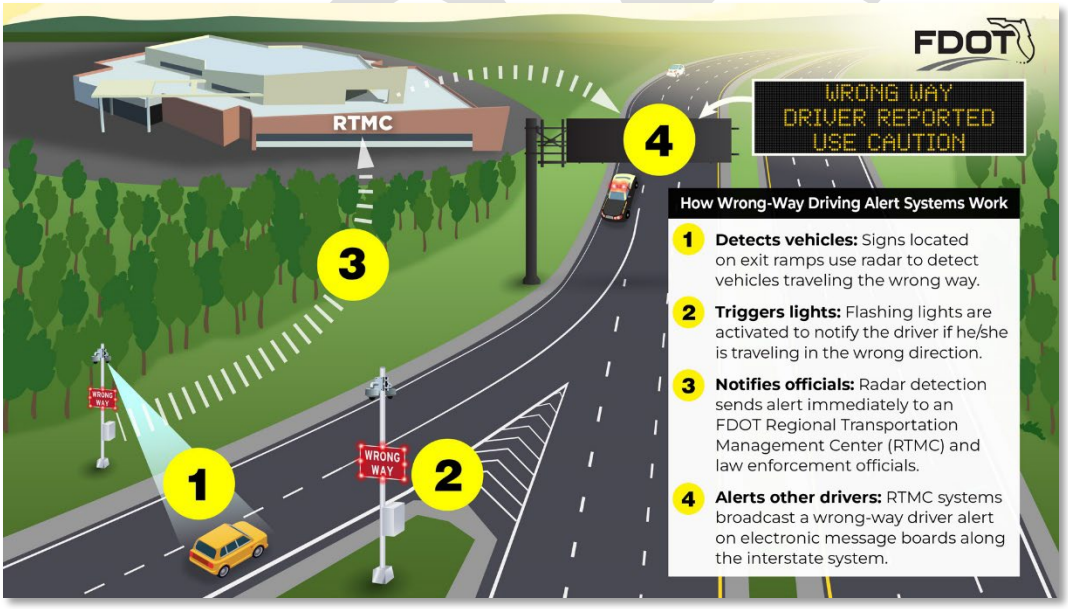


Figure 52 - Wrong-Way ITS Treatment Overview (FDOT Example)

WRONG-WAY DRIVING NETWORK SCREENING

The National Cooperative Highway Research Program (NCHRP) Report 1050 – Wrong-Way Driving Solutions Handbook was released in the summer of 2023 and provides a comprehensive overview of the concern as well as a wide range of potential treatments, many of which have been discussed in preceding sections. While the focus of this report is primarily on interchanges and limited access facilities, many treatment strategies are applicable to local surface streets and intersections as well. The report also provides a methodology for performing network screening to help identify potential areas of concern. Consider scheduling routine screenings or review procedures to systematically evaluate and implement wrong-way driving treatments across the WestPlan MPO.

4 LIVING DOCUMENT

4.1 IMPLEMENTATION & EVALUATION

The Safe System Approach works toward the eventual elimination of fatalities and incapacitating injuries on the transportation network by supporting safe road users, safe vehicles, safe speeds, safe roads, and post-crash care. The WestPlan MPO has taken the initiative to build off previous safety efforts to work toward this goal. Part of that process is the development of this Safety Action Plan, a living document to be updated and maintained as new data, strategies, and community needs arise. This will be augmented through additional public engagement and Equity Analysis and Outreach to better target safety treatments and programs to make sure the most vulnerable populations are supported in a holistic and comprehensive way.

The US Department of Transportation has distributed a Safe Streets and Roads for All Self-Certification Eligibility Worksheet, included in the Appendix. This form is intended to help SS4A grant applications assess their readiness. While this Safety Action Plan meets several foundational criteria for ongoing and future efforts to enhance equity, considerations and guidance will be a critical next step in the process.

The WestPlan MPO will monitor the region's progress toward zero fatal and incapacitating injury crashes via crash rates and other relevant metrics as needed. This will help to inform the overall performance of the plan and targeted treatment areas. Review and evaluation of the WestPlan MPO transportation safety should be conducted on a routine basis to ensure that the plan reflects current data, concerns, and community need and be revised when necessary to address these areas. This includes demographic information and equity analysis to help address transportation safety needs for the most vulnerable populations.

Tracked progress, ongoing and future efforts, as well as opportunities for public feedback and engagement, will be maintained by the WestPlan MPO and facilitated through several public-facing engagement tools. Project performance should be tracked and evaluated to help assess current impacts and any immediate follow-up concerns, as well as carrying lessons learned forward into future projects. As this plan is a living document, these routine assessments and plan revisions should address both emerging crash trends and driver behaviors as alongside the incorporation of new technologies and safety treatments. Additionally, as the report is updated and maintained, it should remain publicly available. In this way, the Safety Action Plan will remain a living document, adapting and adjusting according to the needs of the local communities, and is designed to serve and support while being future-forward.

APPENDIX

APPENDIX

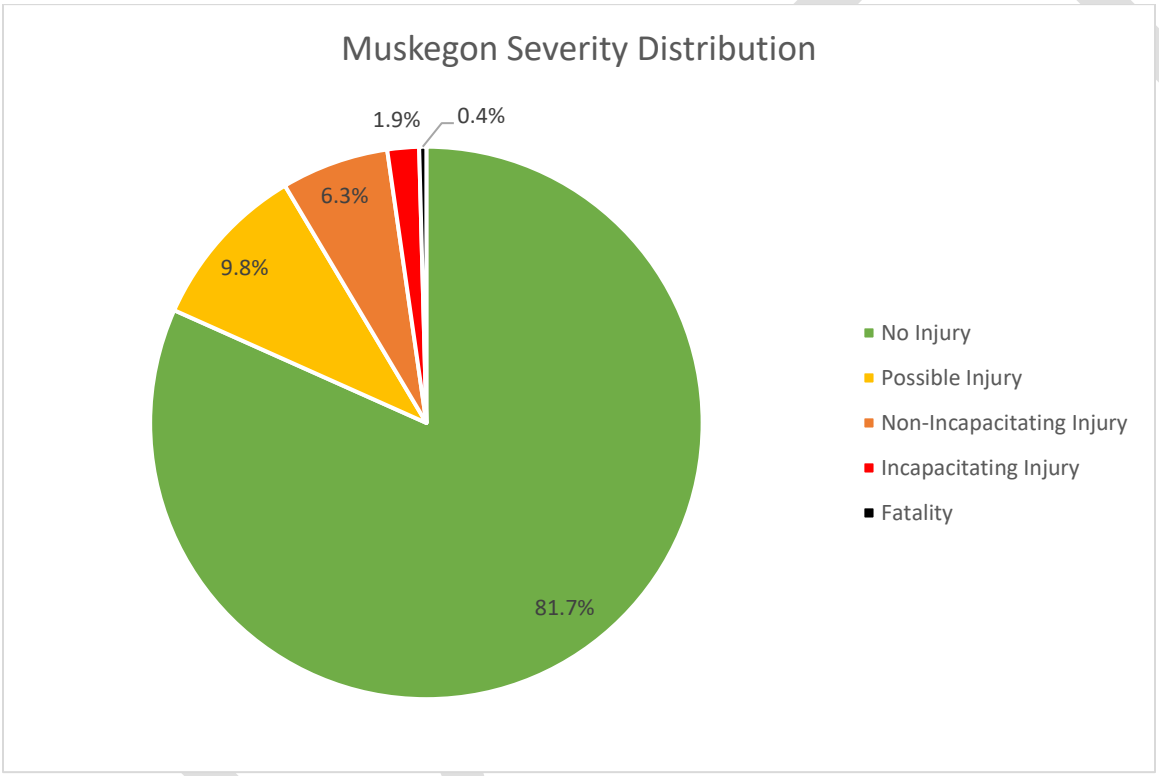
A-1 CRASH ANALYSIS

The following sections provide a crash summary of the WestPlan MPO by individual county as well as the combined MPO areas. Additional experts from the US DOT Equitable Transportation Community Explorer are provided for reference.

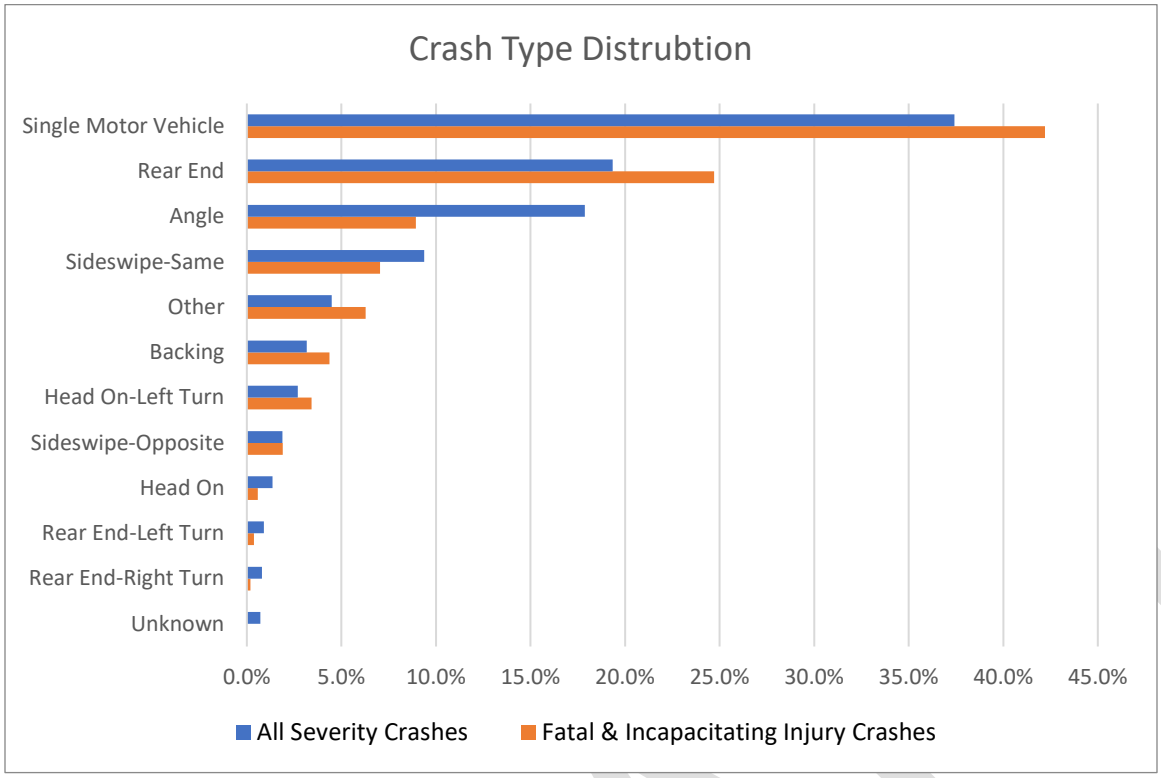
MUSKEGON COUNTY

CRASH SUMMARY (2018 – 2022)

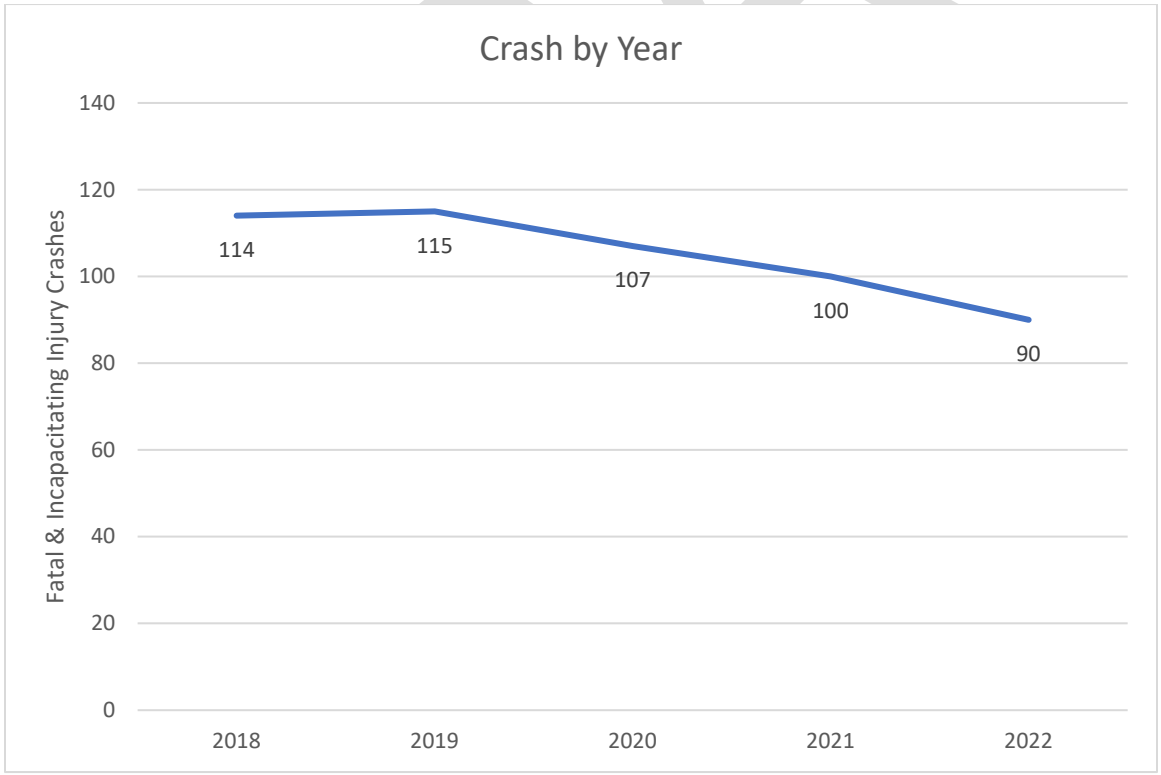
SEVERITY



TYPE

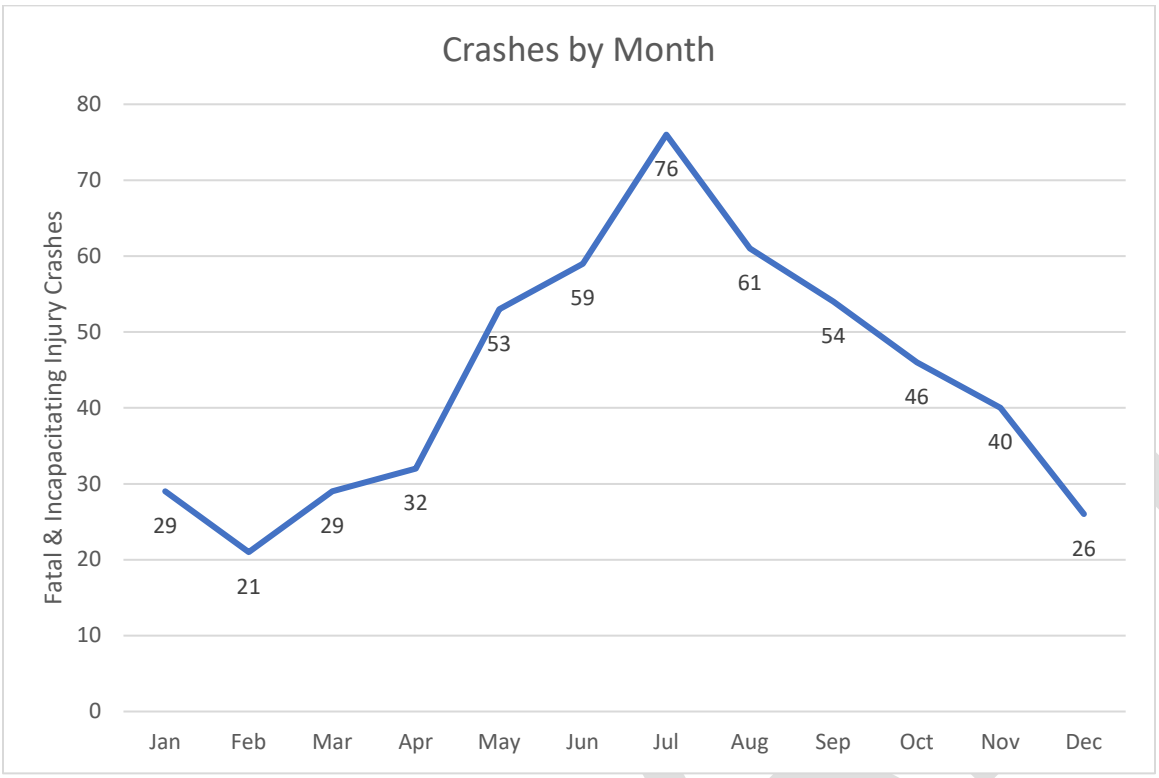

Crash Type Distrubtion
Single Motor Vehicle
Rear End
Angle
Sideswipe-Same
Other
Backing
Head On-Left Turn
Sideswipe-Opposite
Head On
Rear End-Left Turn
Rear End-Right Turn
Unknown
0.0%
5.0%
10.0%
15.0%
20.0%
25.0%
30.0%
35.0%
40.0%
45.0%
All Severity Crashes
Fatal & Incapacitating Injury Crashes

YEAR

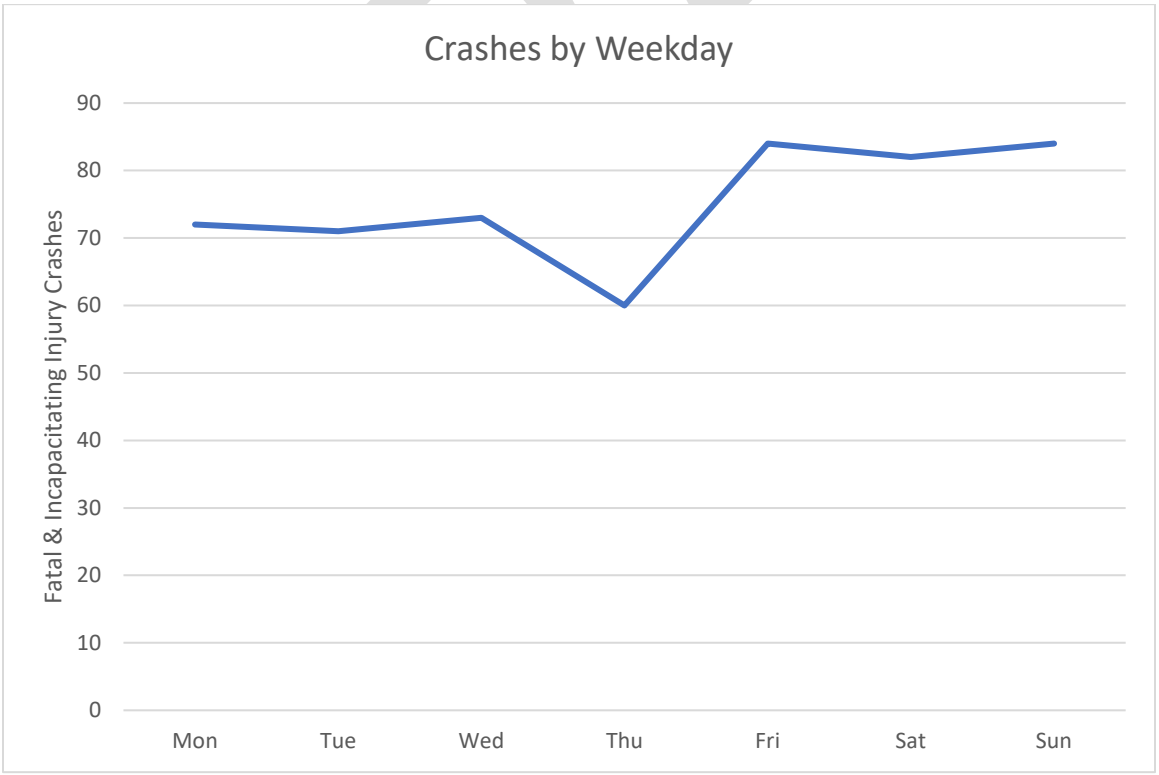

Crash by Year
Fatal & Incapacitating Injury Crashes
140
120
100
80
60
40
20
0
114
115
107
100
90
2018
2019
2020
2021
2022

APPENDIX

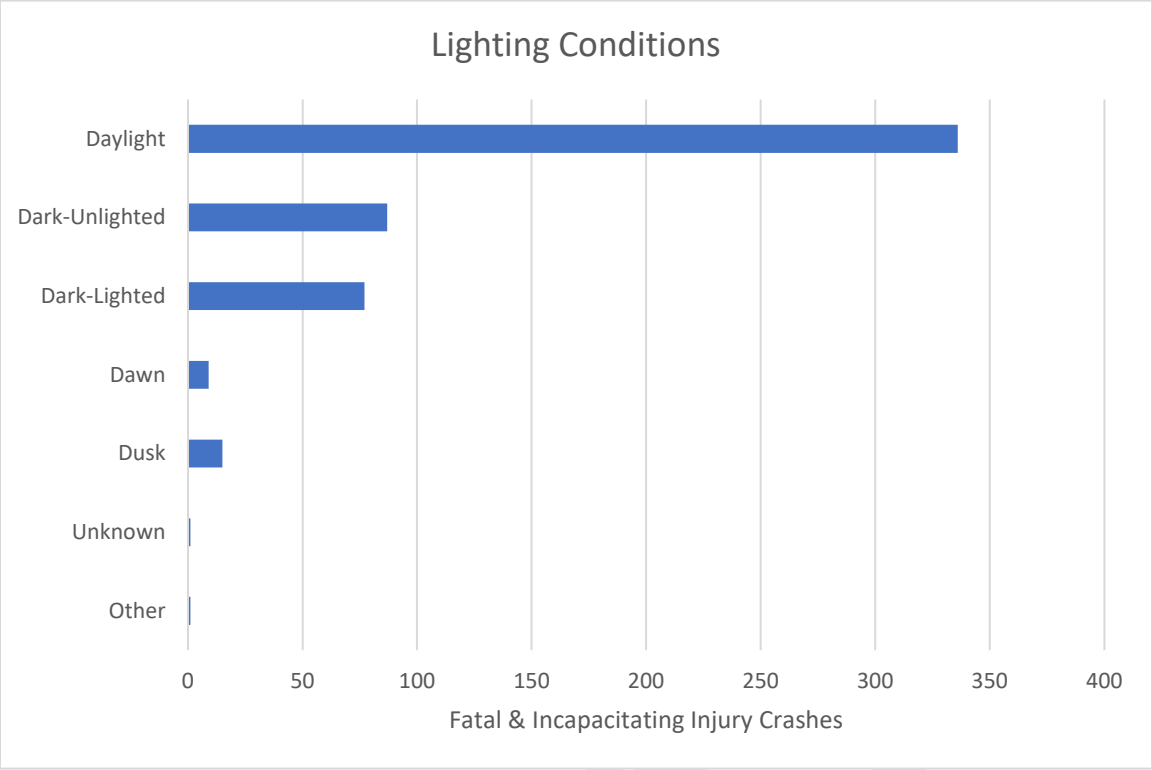
MONTH



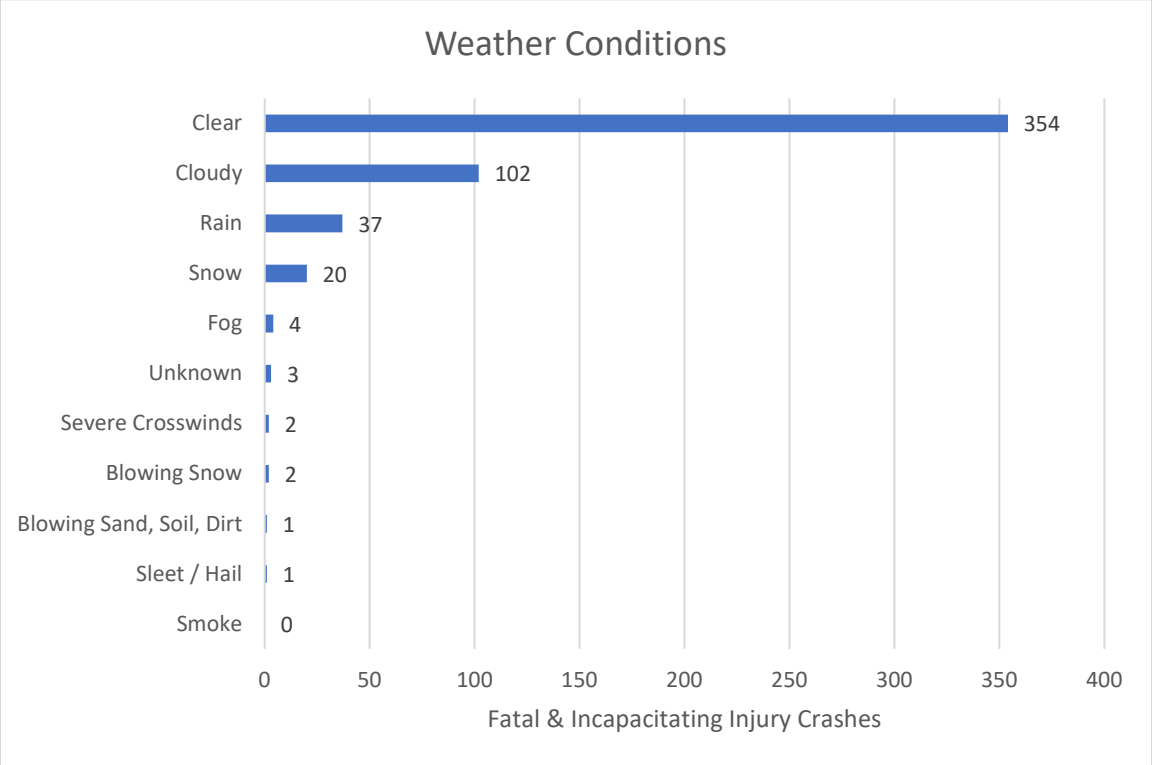
WEEKDAY



LIGHTING CONDITIONS

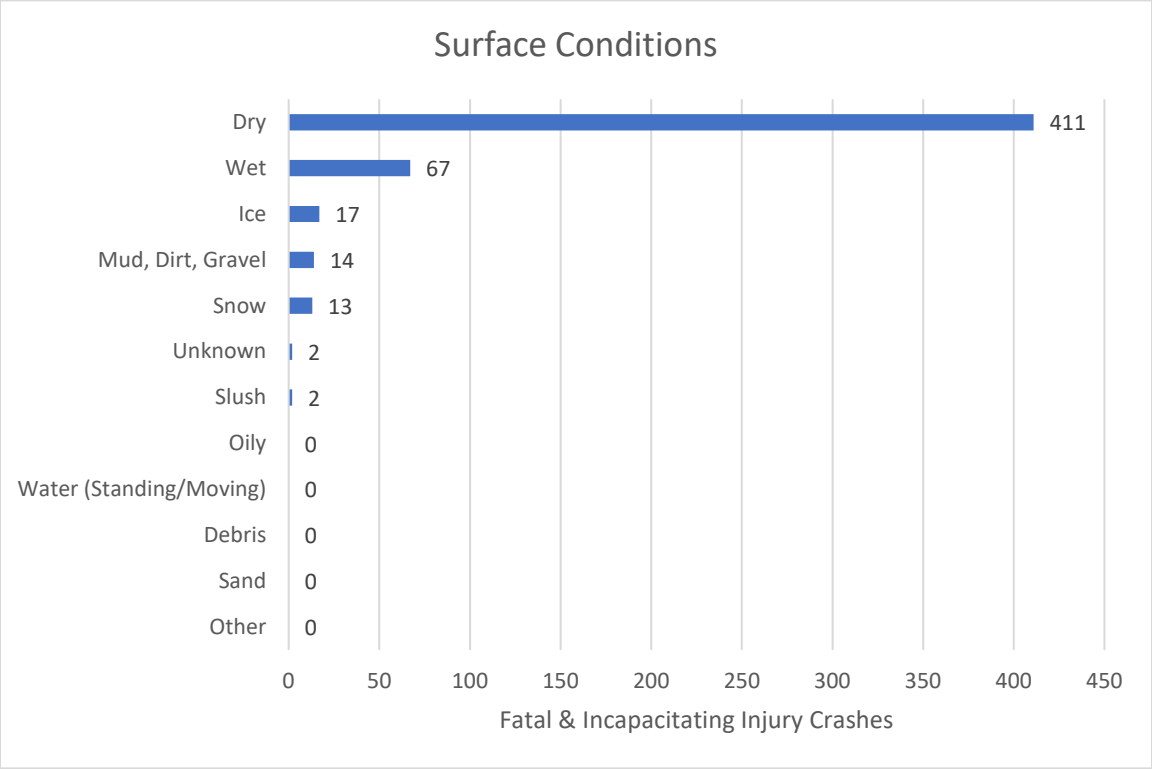


WEATHER CONDITIONS

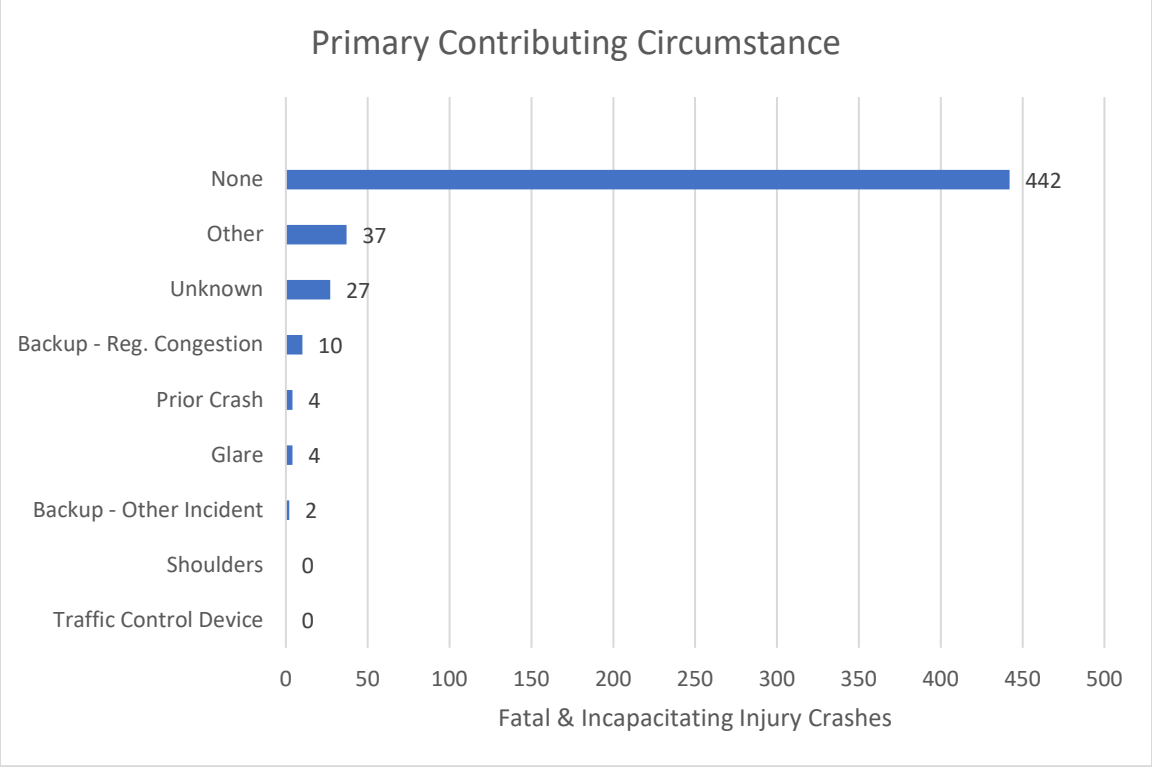


APPENDIX

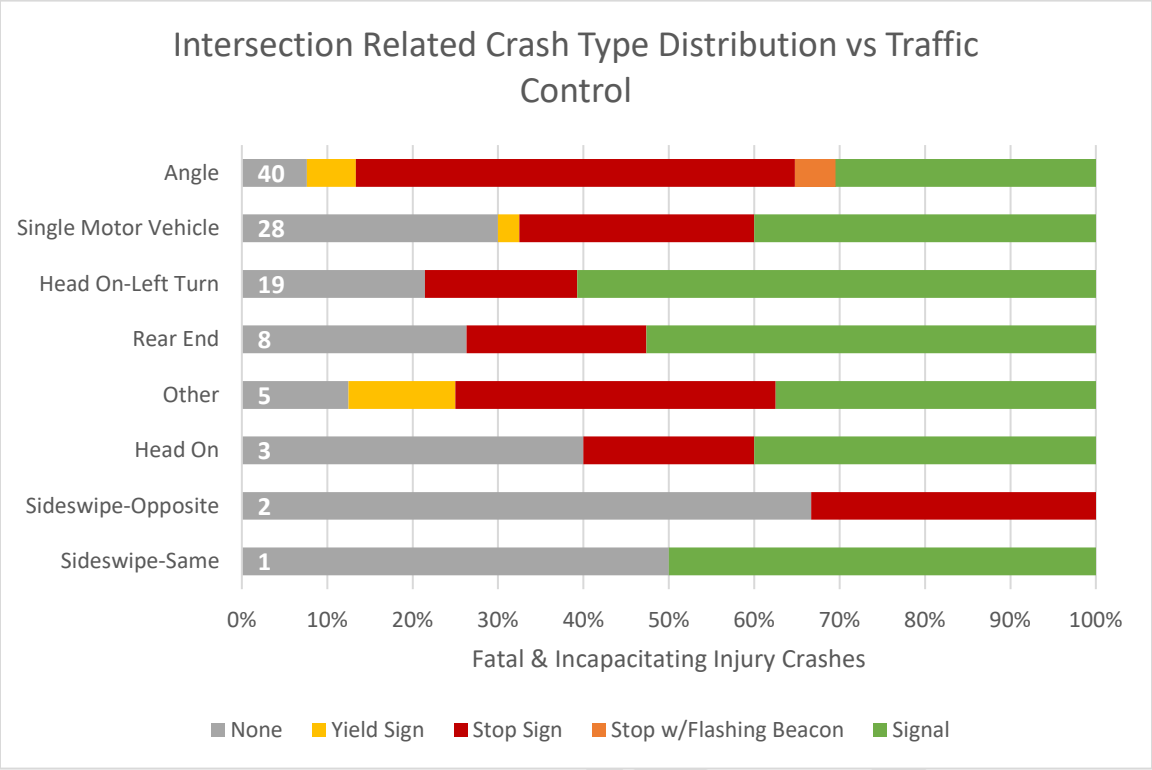
SURFACE CONDITIONS



CONTRIBUTING CIRCUMSTANCES

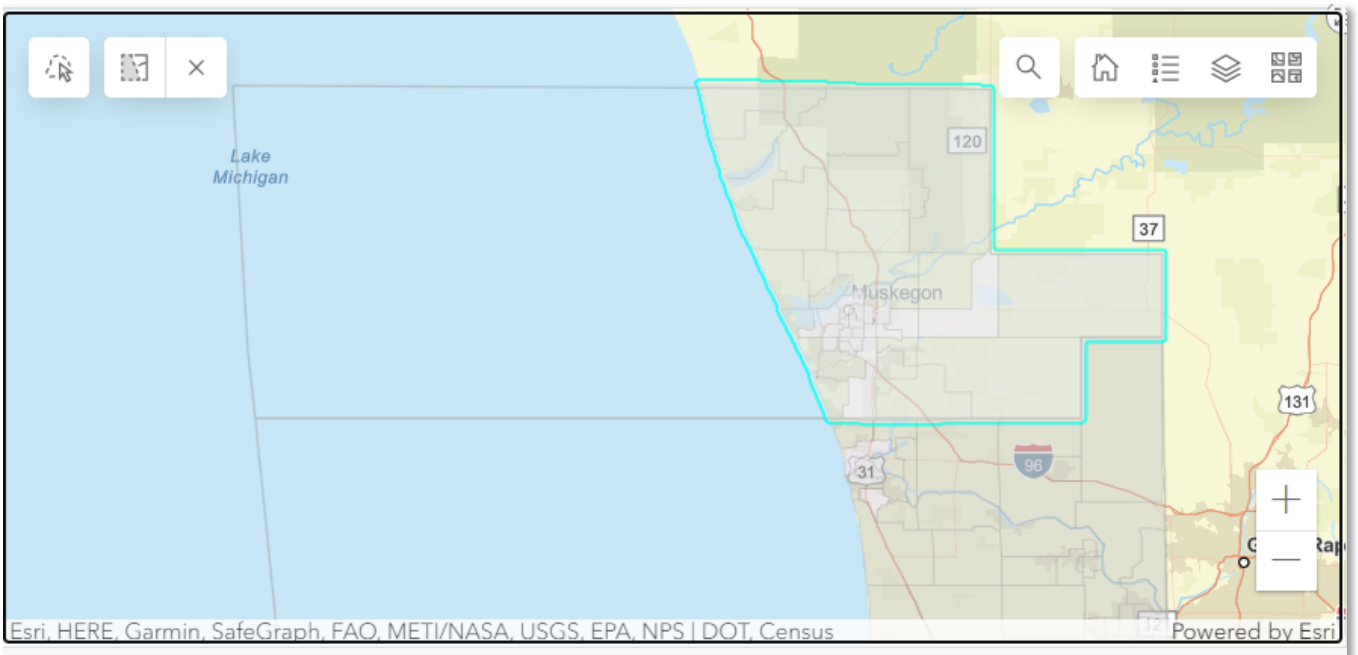


INTERSECTION CRASH TYPES

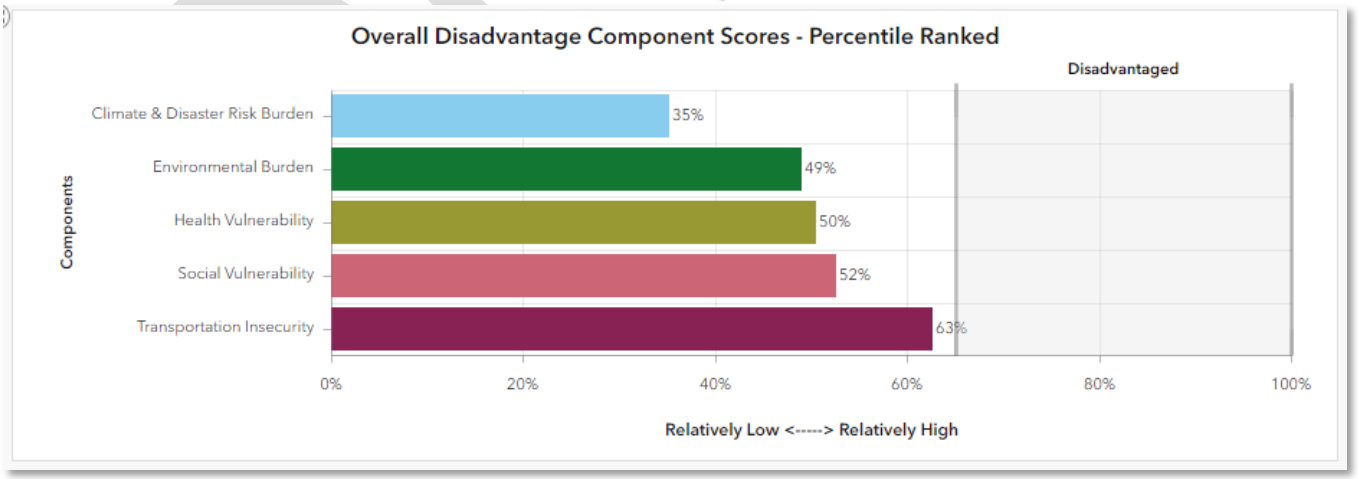


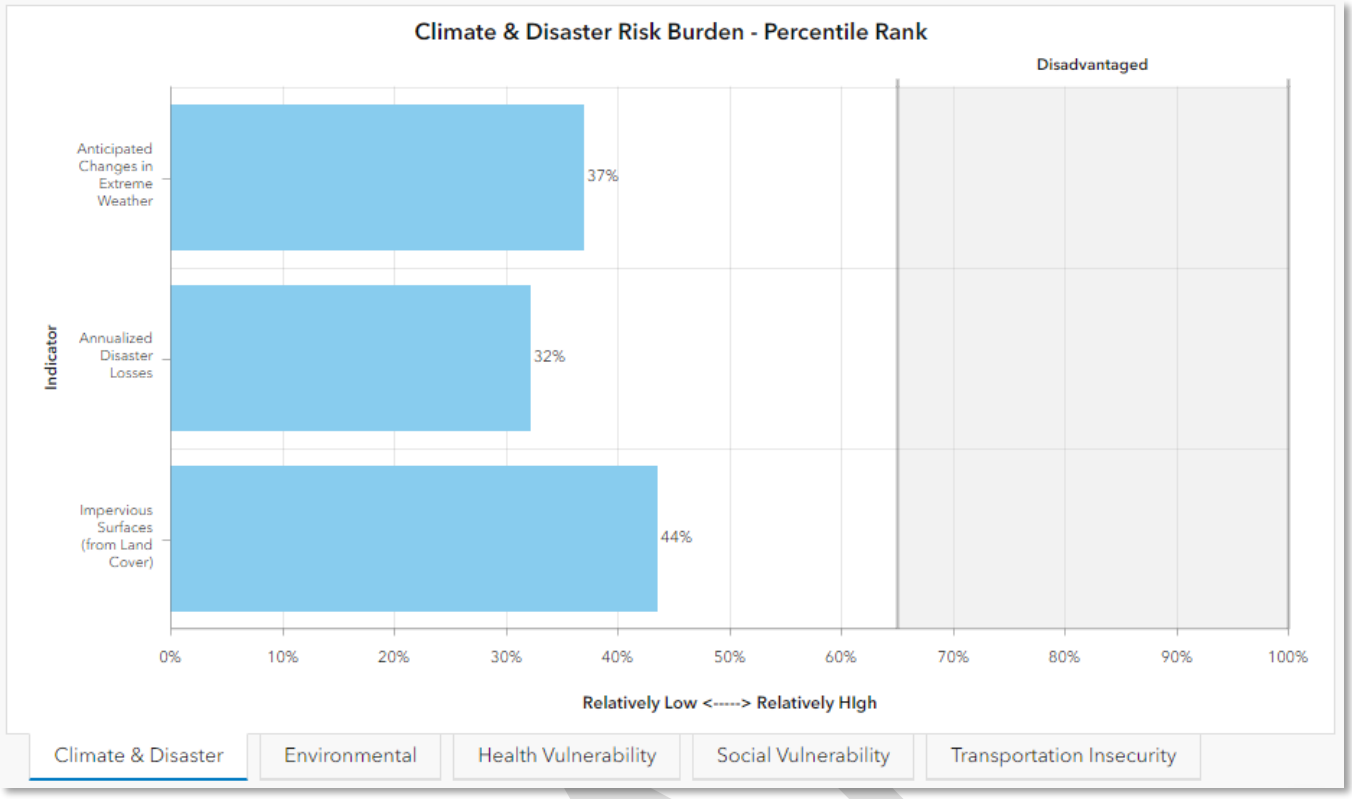
APPENDIX

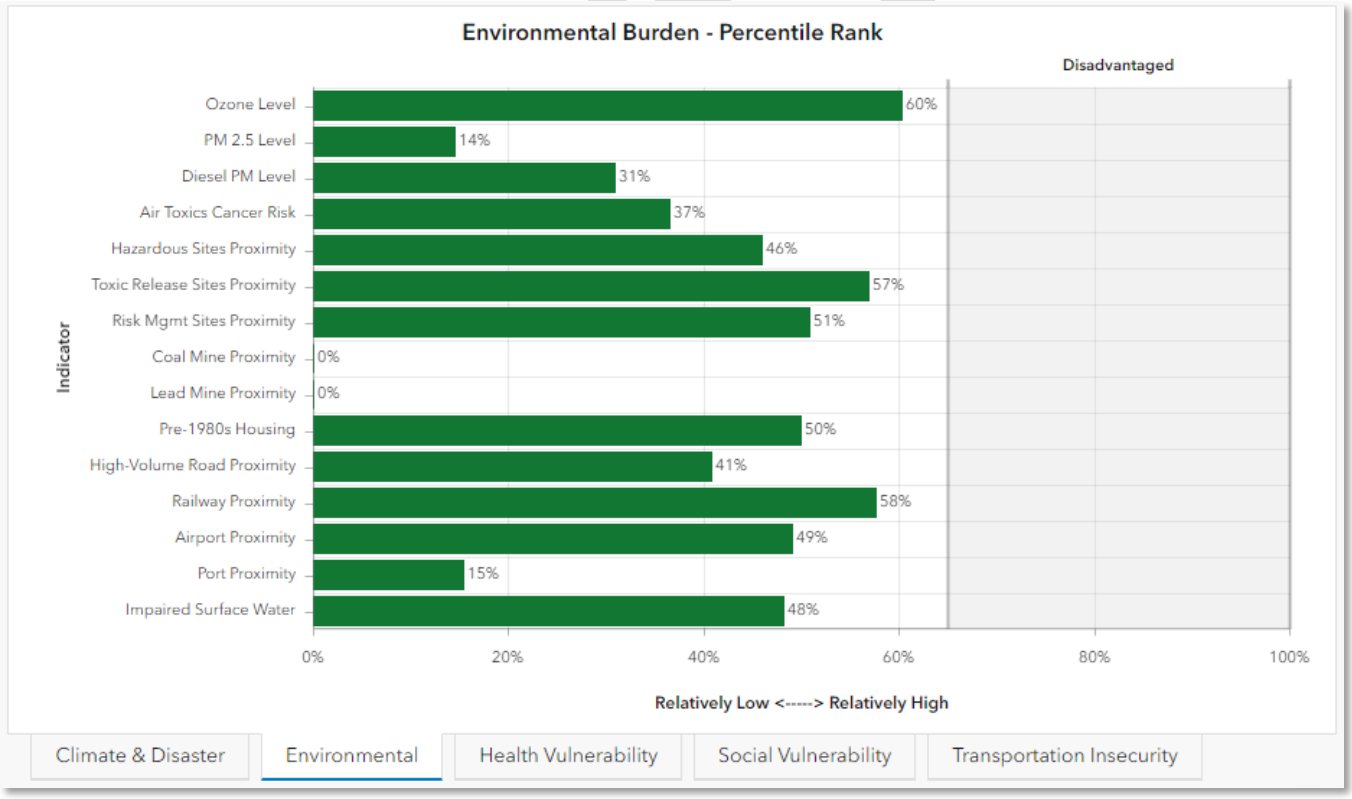
MUSKEGON DISADVATANGED COMMUNITIES



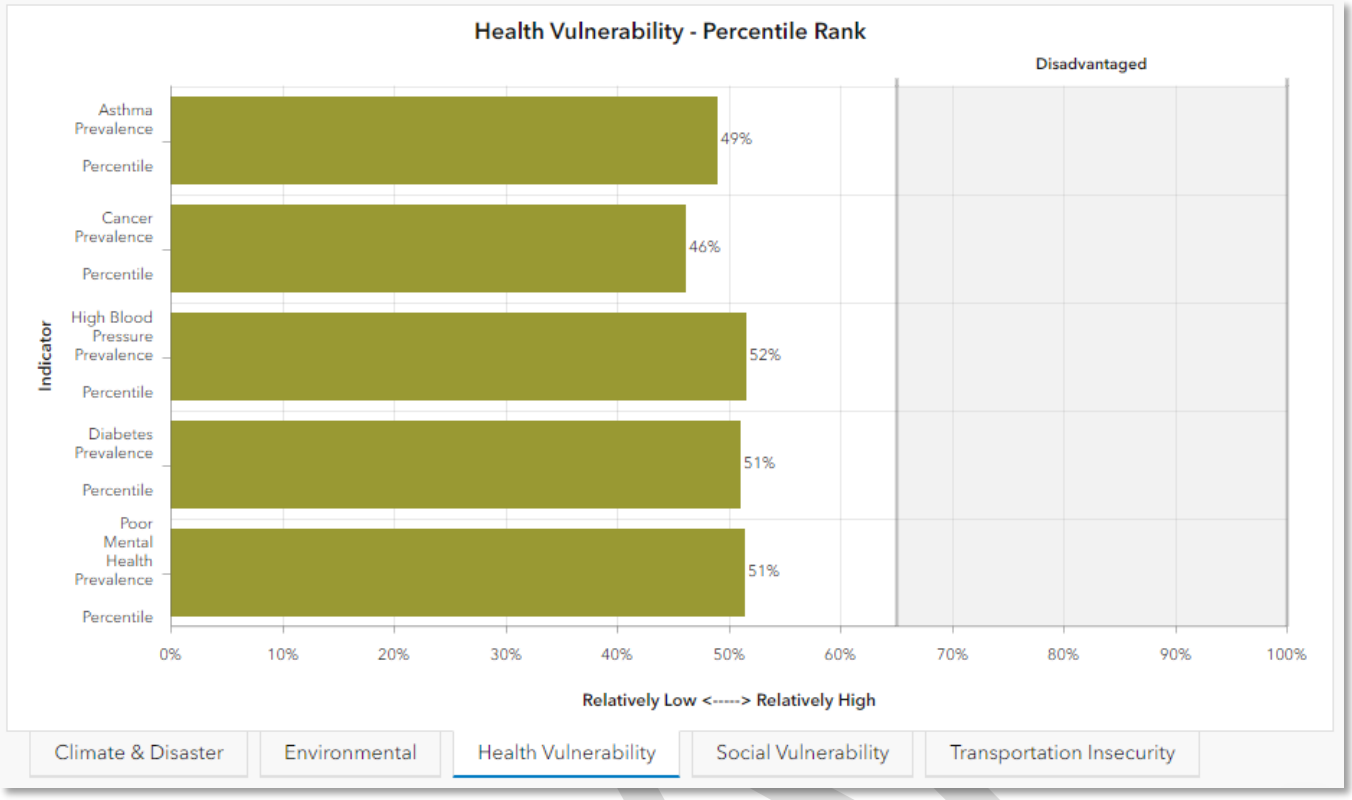
Total Population Living in	Total Population Living in Disadvantaged Census Tracts in	% of Disadvantaged Census Tracts in the Selected Project
173.7k	67.6k	42%

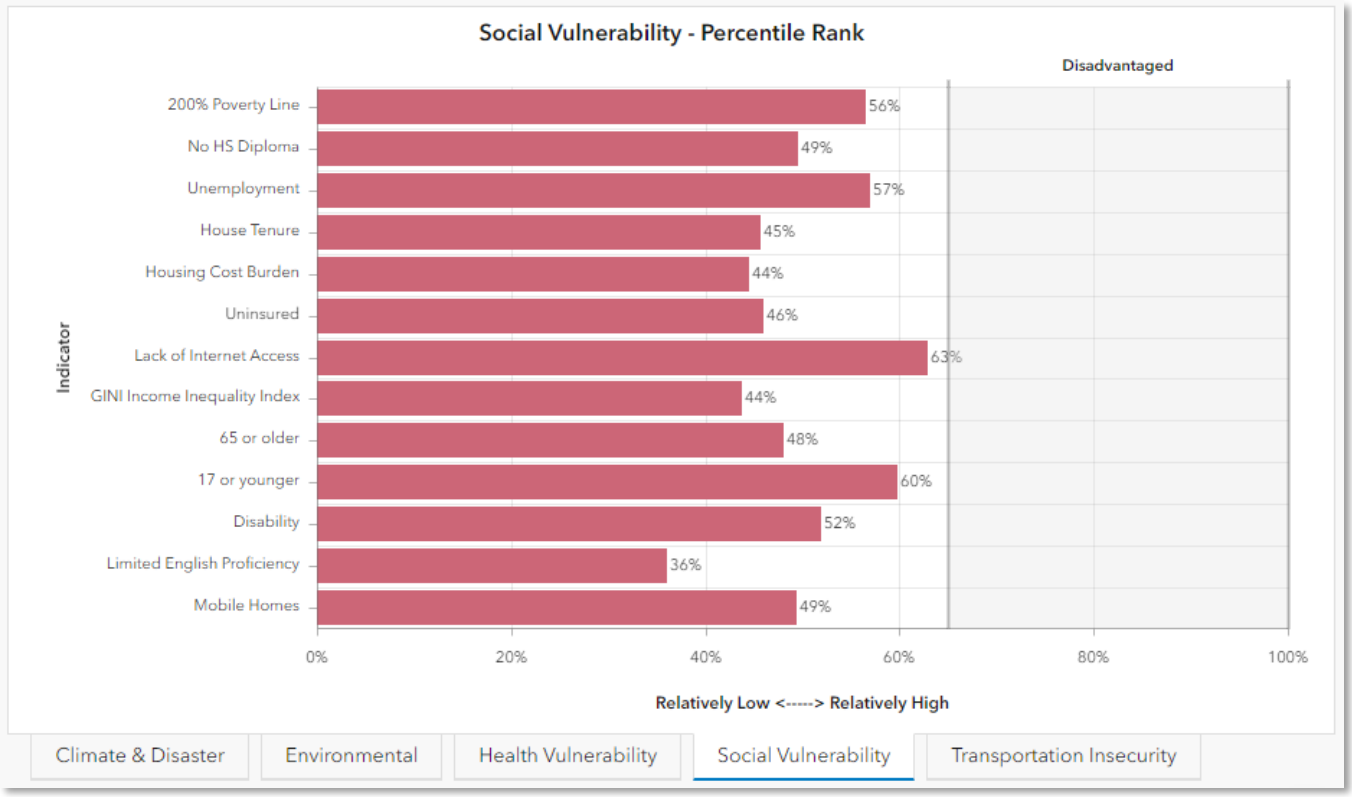


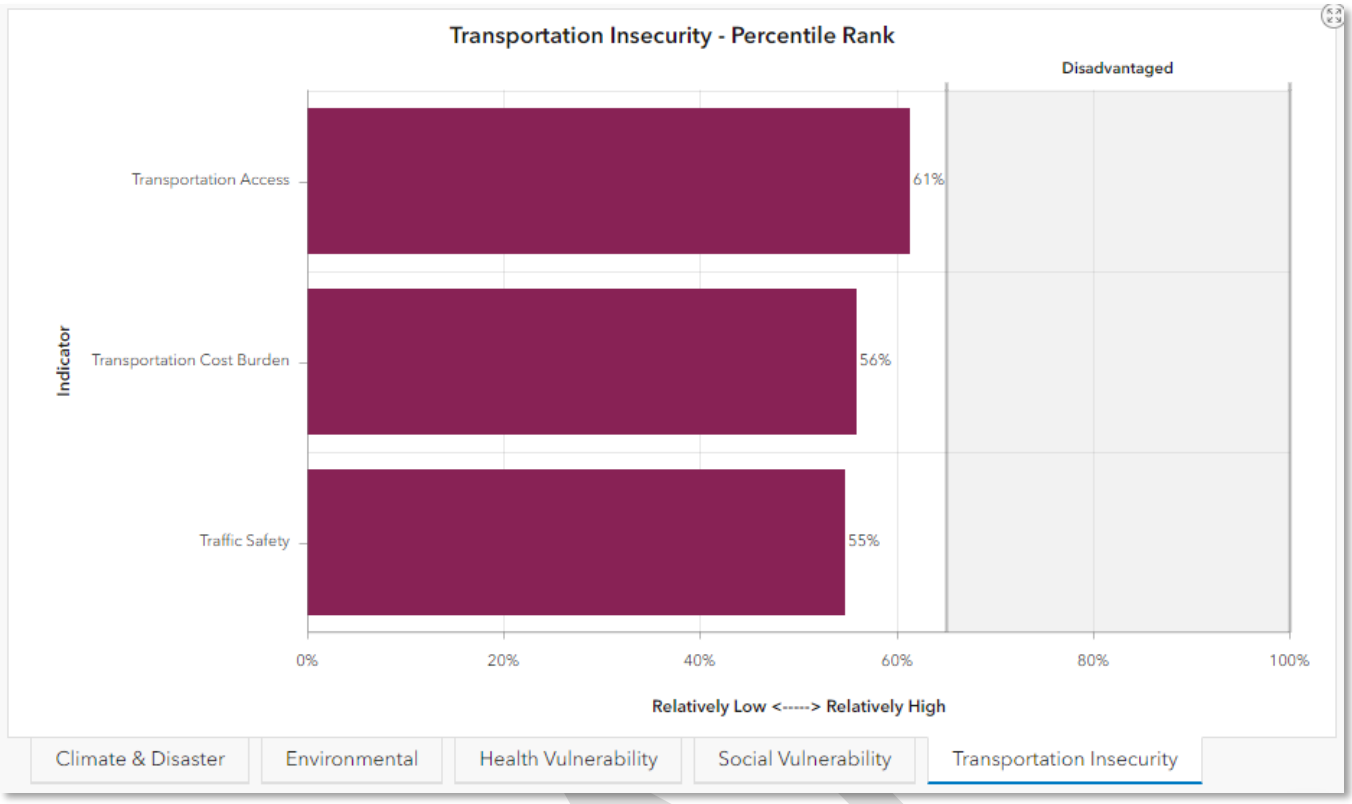

Climate & Disaster Risk Burden - Percentile Rank
Disadvantaged
Anticipated Changes in Extreme Weather
37%
Annualized Disaster Losses
32%
Impervious Surfaces (from Land Cover)
44%
Indicator
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Relatively Low <-----> Relatively HIgh
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity


Environmental Burden - Percentile Rank
Disadvantaged
Ozone Level
60%
PM 2.5 Level
14%
Diesel PM Level
31%
Air Toxics Cancer Risk
37%
Hazardous Sites Proximity
46%
Toxic Release Sites Proximity
57%
Risk Mgmt Sites Proximity
51%
Coal Mine Proximity
0%
Lead Mine Proximity
0%
Pre-1980s Housing
50%
High-Volume Road Proximity
41%
Railway Proximity
58%
Airport Proximity
49%
Port Proximity
15%
Impaired Surface Water
48%
Indicator
0%
20%
40%
60%
80%
100%
Relatively Low <-----> Relatively High
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity

APPENDIX


Health Vulnerability - Percentile Rank
Disadvantaged
Asthma Prevalence Percentile
Cancer Prevalence Percentile
High Blood Pressure Prevalence Percentile
Diabetes Prevalence Percentile
Poor Mental Health Prevalence Percentile
Indicator
49%
46%
52%
51%
51%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Relatively Low <-----> Relatively High
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity


Social Vulnerability - Percentile Rank
Disadvantaged
200% Poverty Line
No HS Diploma
Unemployment
House Tenure
Housing Cost Burden
Uninsured
Lack of Internet Access
GINI Income Inequality Index
65 or older
17 or younger
Disability
Limited English Proficiency
Mobile Homes
Indicator
56%
49%
57%
45%
44%
46%
63%
44%
48%
60%
52%
36%
49%
0%
20%
40%
60%
80%
100%
Relatively Low <-----> Relatively High
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity

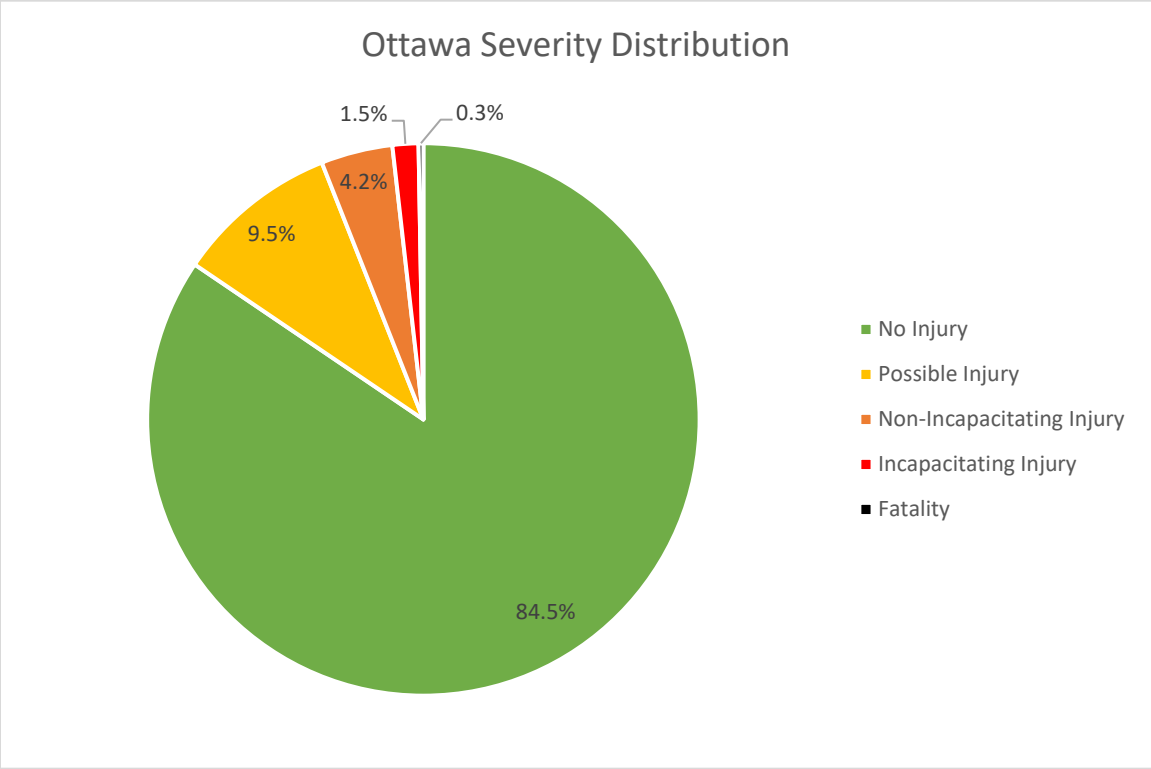

Transportation Insecurity - Percentile Rank
Disadvantaged
Transportation Access
61%
Transportation Cost Burden
56%
Traffic Safety
55%
Indicator
0%
20%
40%
60%
80%
100%
Relatively Low <-----> Relatively High
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity

APPENDIX

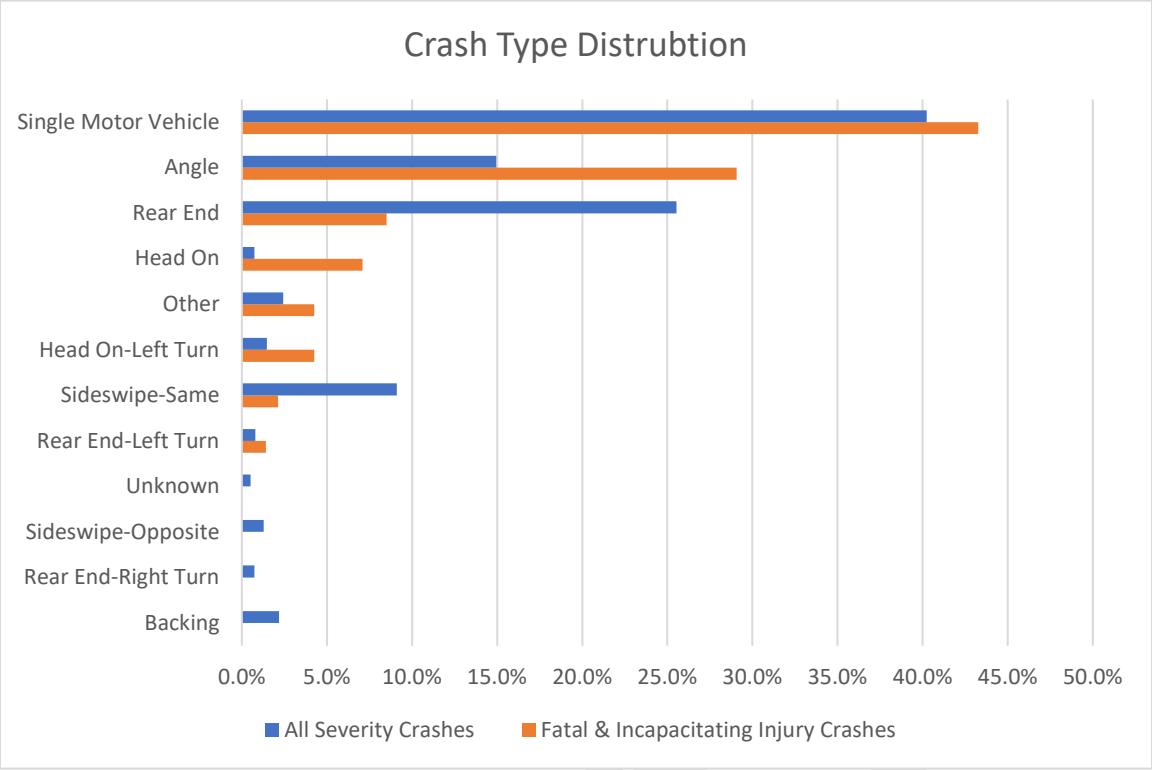
OTTAWA COUNTY

CRASH SUMMARY (2018 – 2022)

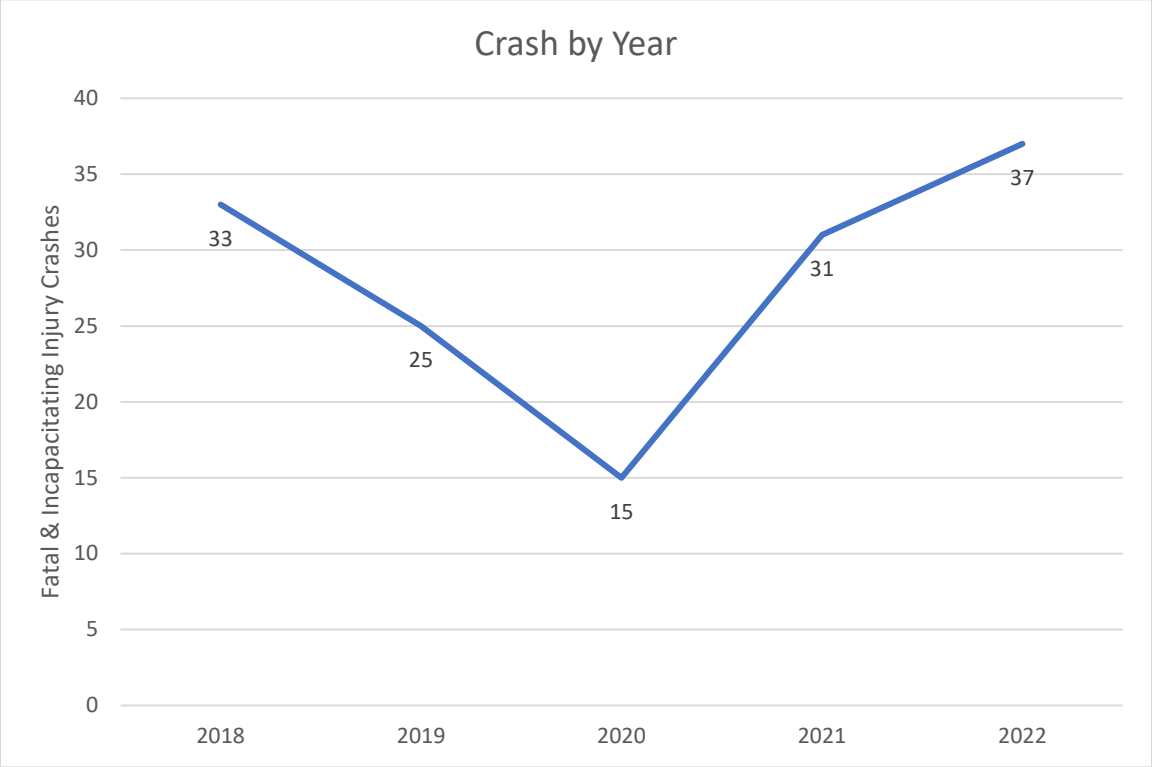
SEVERITY



TYPE

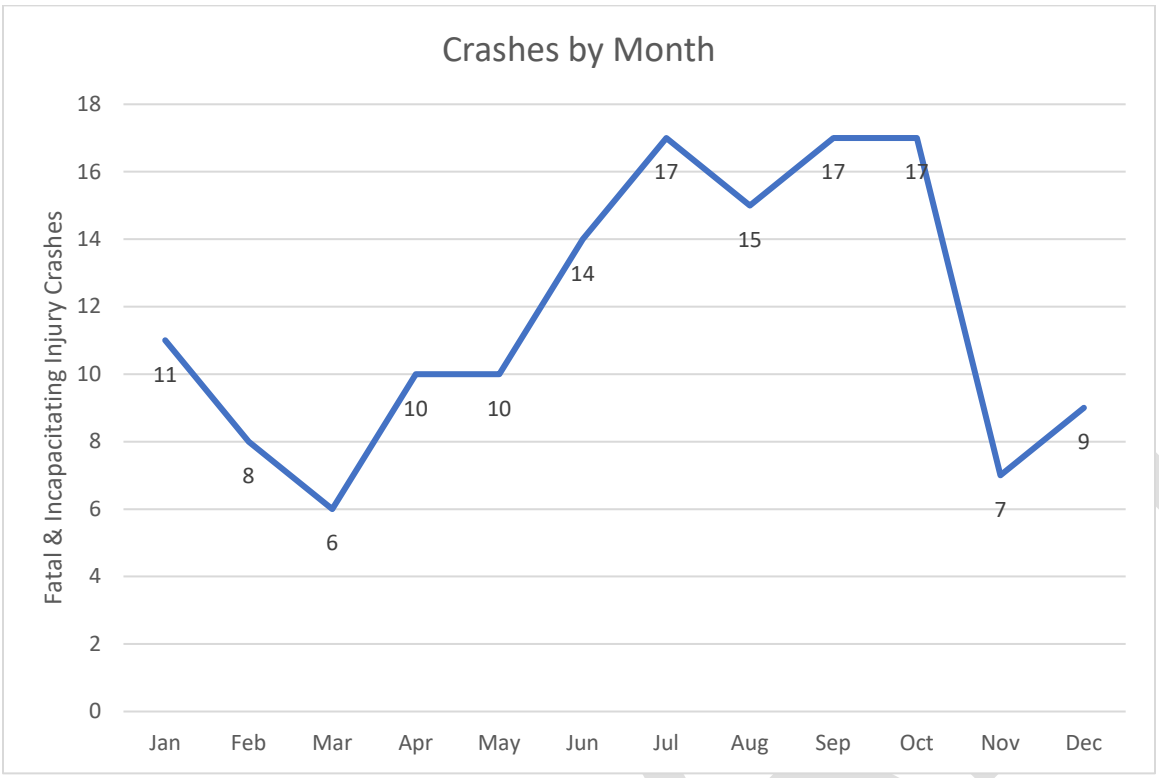

Crash Type Distrubtion
Single Motor Vehicle
Angle
Rear End
Head On
Other
Head On-Left Turn
Sideswipe-Same
Rear End-Left Turn
Unknown
Sideswipe-Opposite
Rear End-Right Turn
Backing
0.0% 5.0% 10.0% 15.0% 20.0% 25.0% 30.0% 35.0% 40.0% 45.0% 50.0%
All Severity Crashes
Fatal & Incapacitating Injury Crashes

YEAR

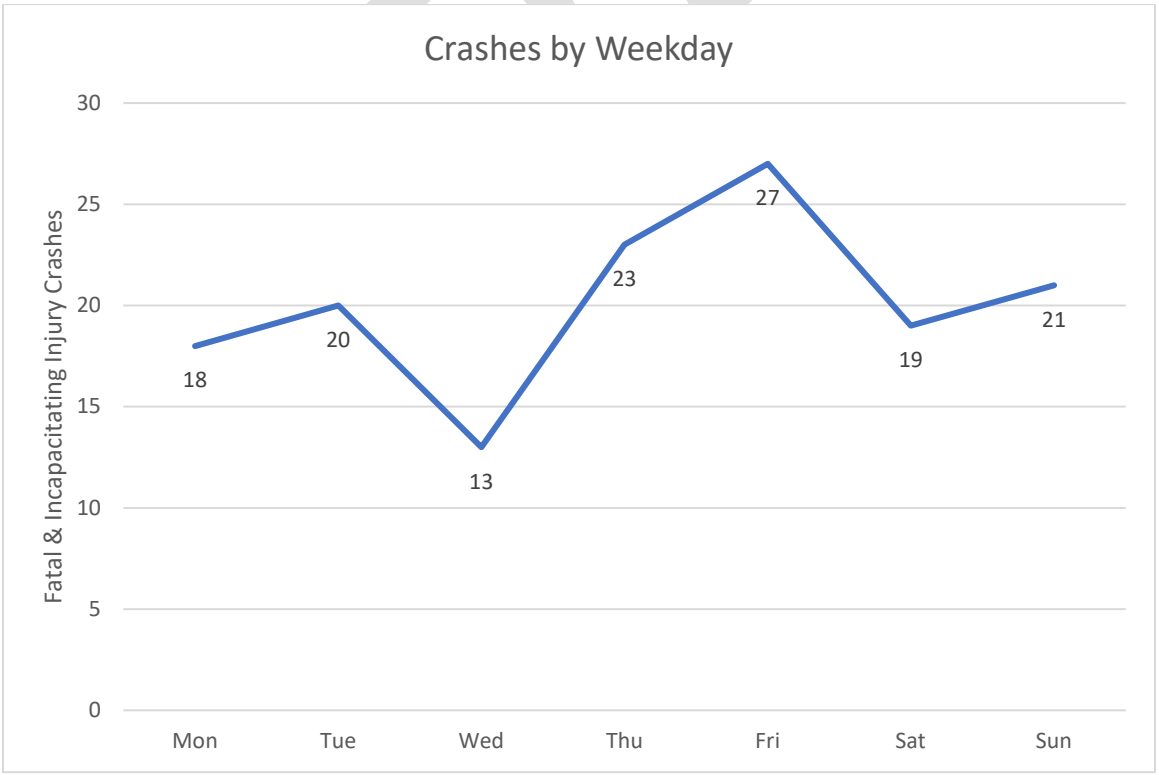

Crash by Year
Fatal & Incapacitating Injury Crashes
40
35
30
25
20
15
10
5
0
33
25
15
31
37
2018
2019
2020
2021
2022

APPENDIX

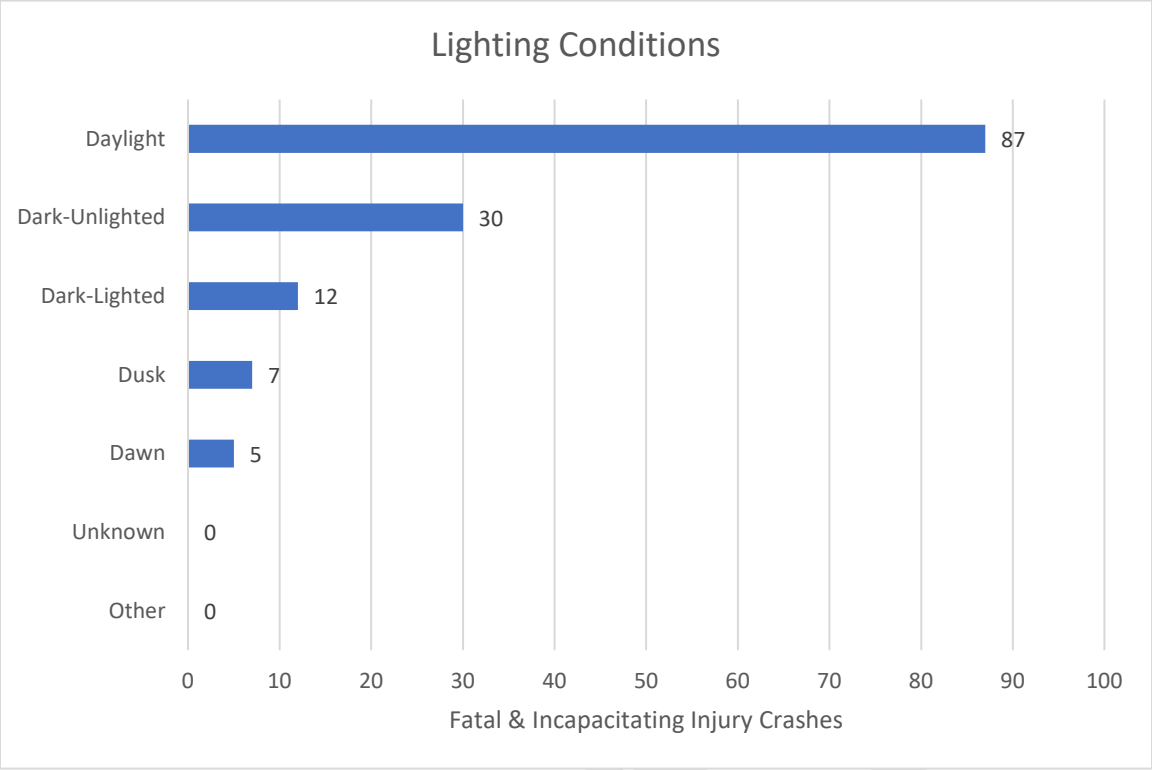
MONTH



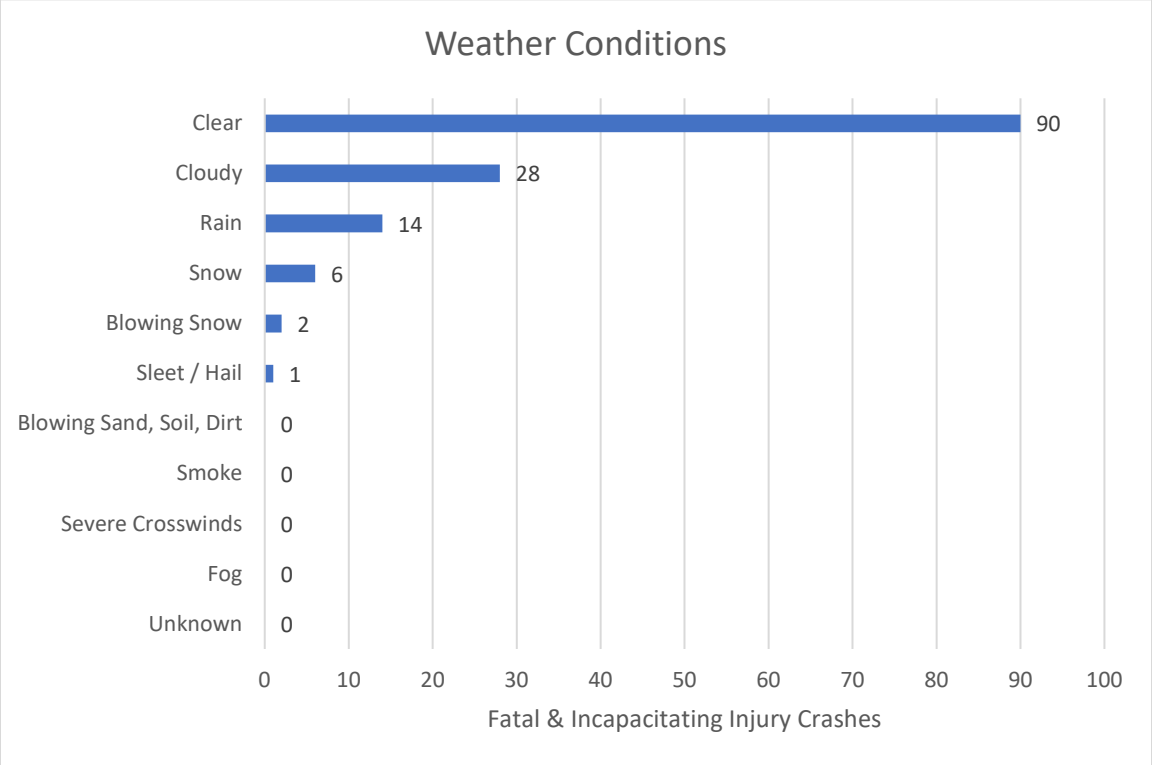
WEEKDAY



LIGHTING CONDITIONS

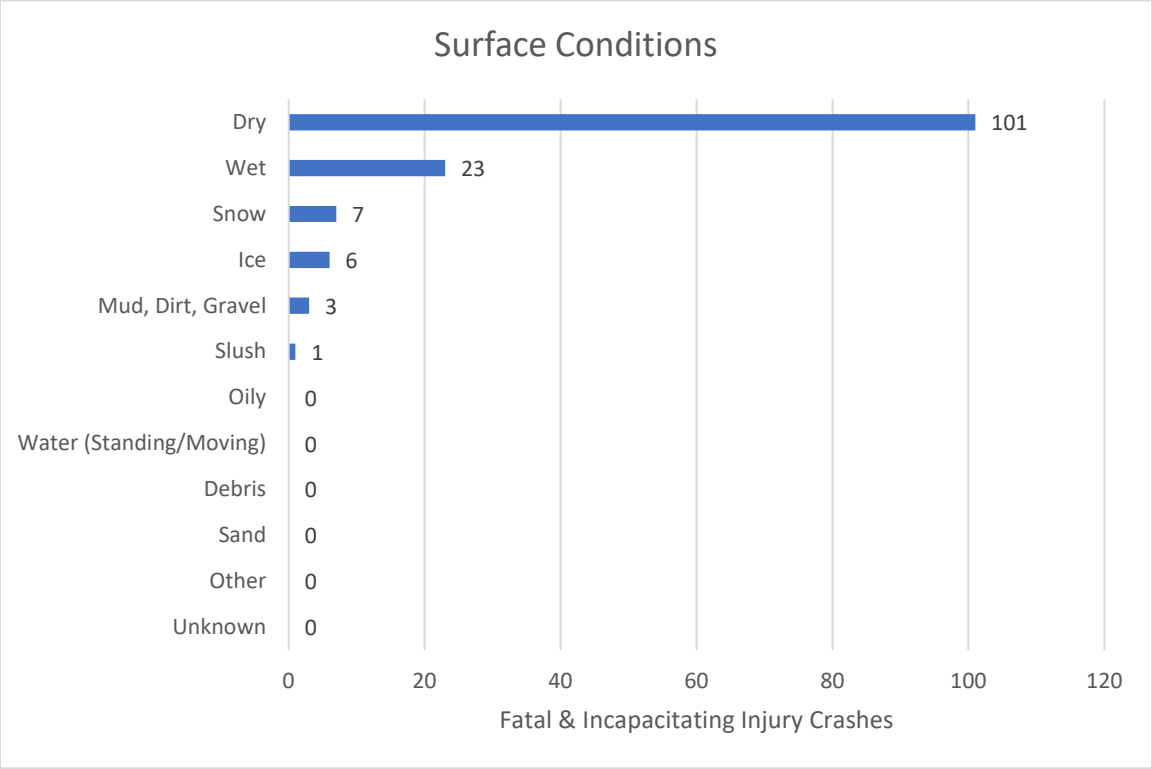


WEATHER CONDITIONS

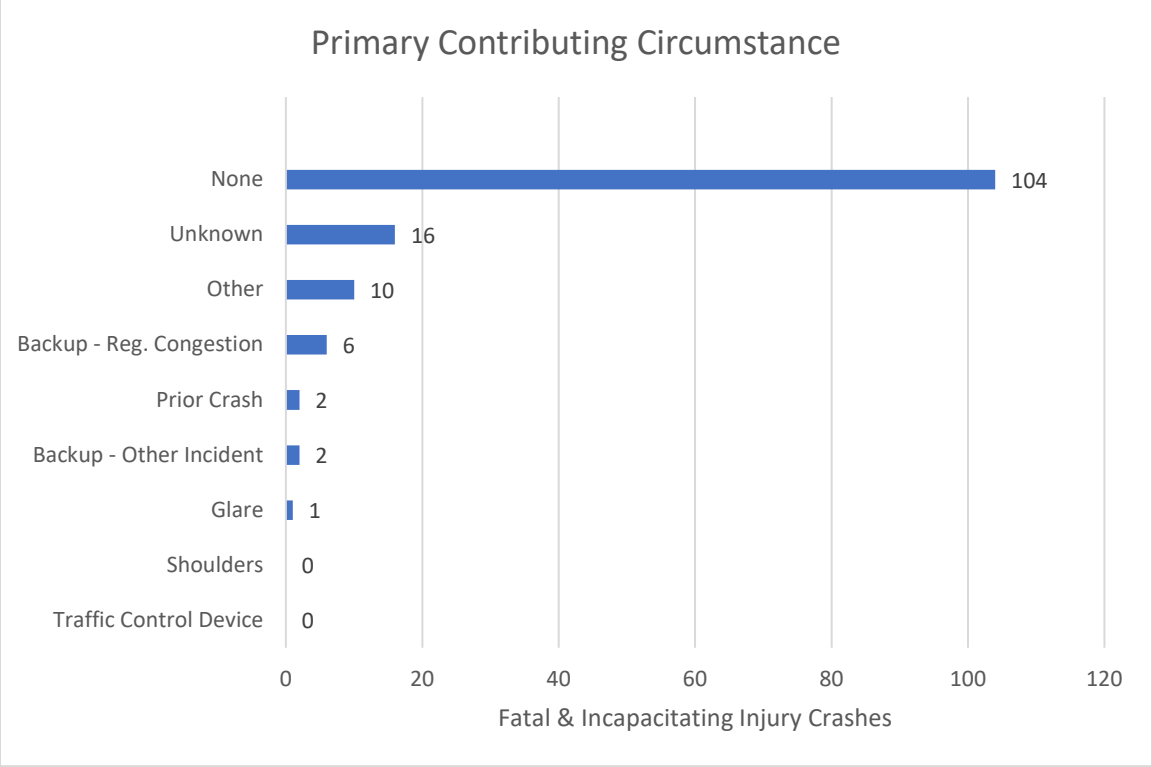


APPENDIX

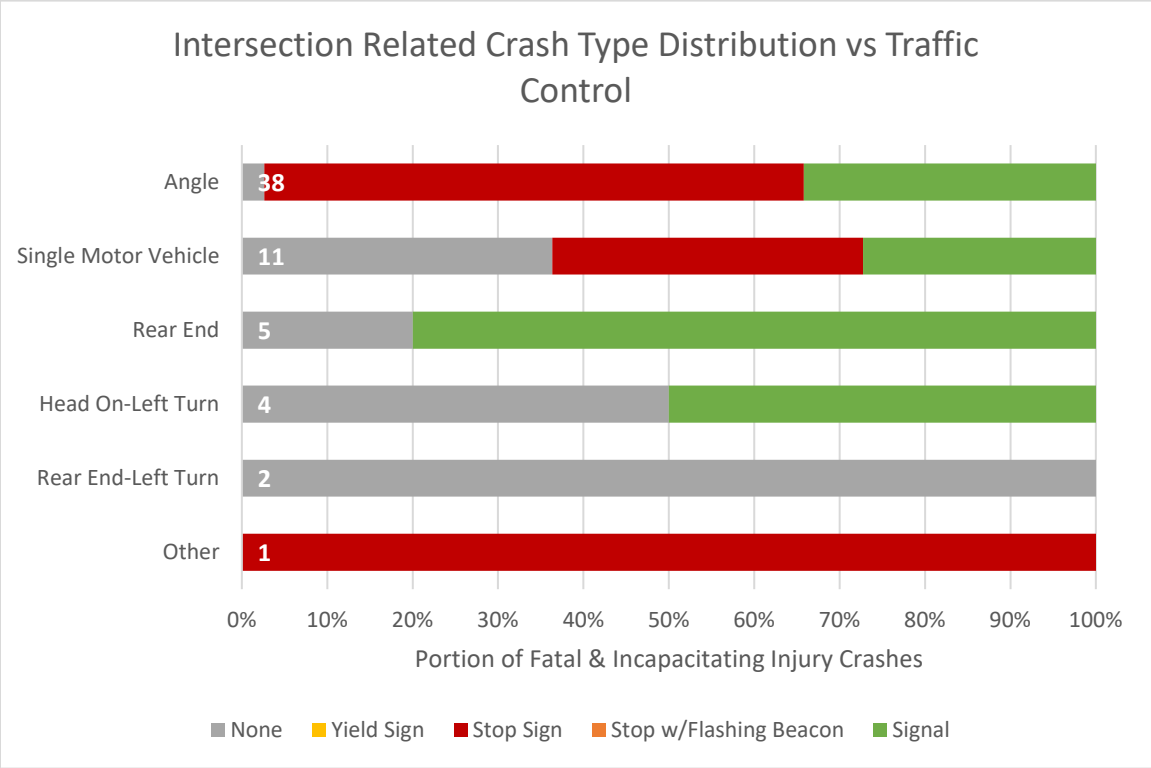
SURFACE CONDITIONS



CONTRIBUTING CIRCUMSTANCES

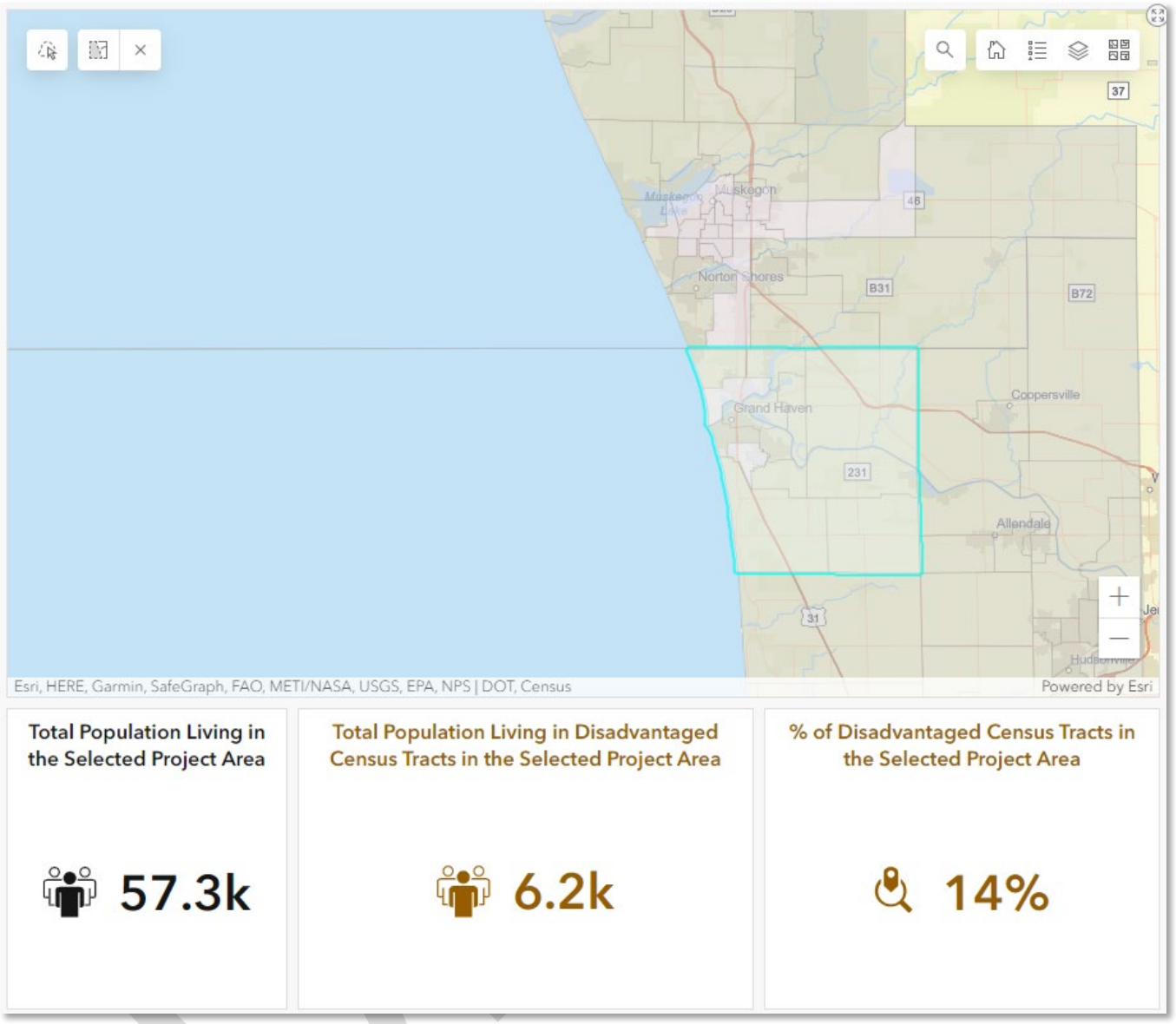


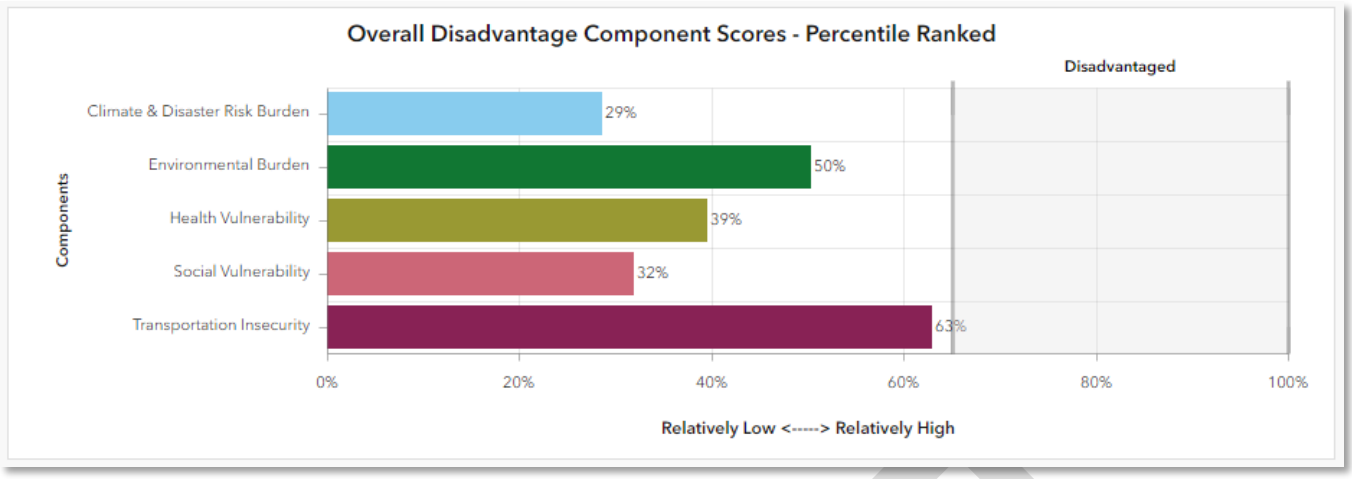
INTERSECTION CRASH TYPES

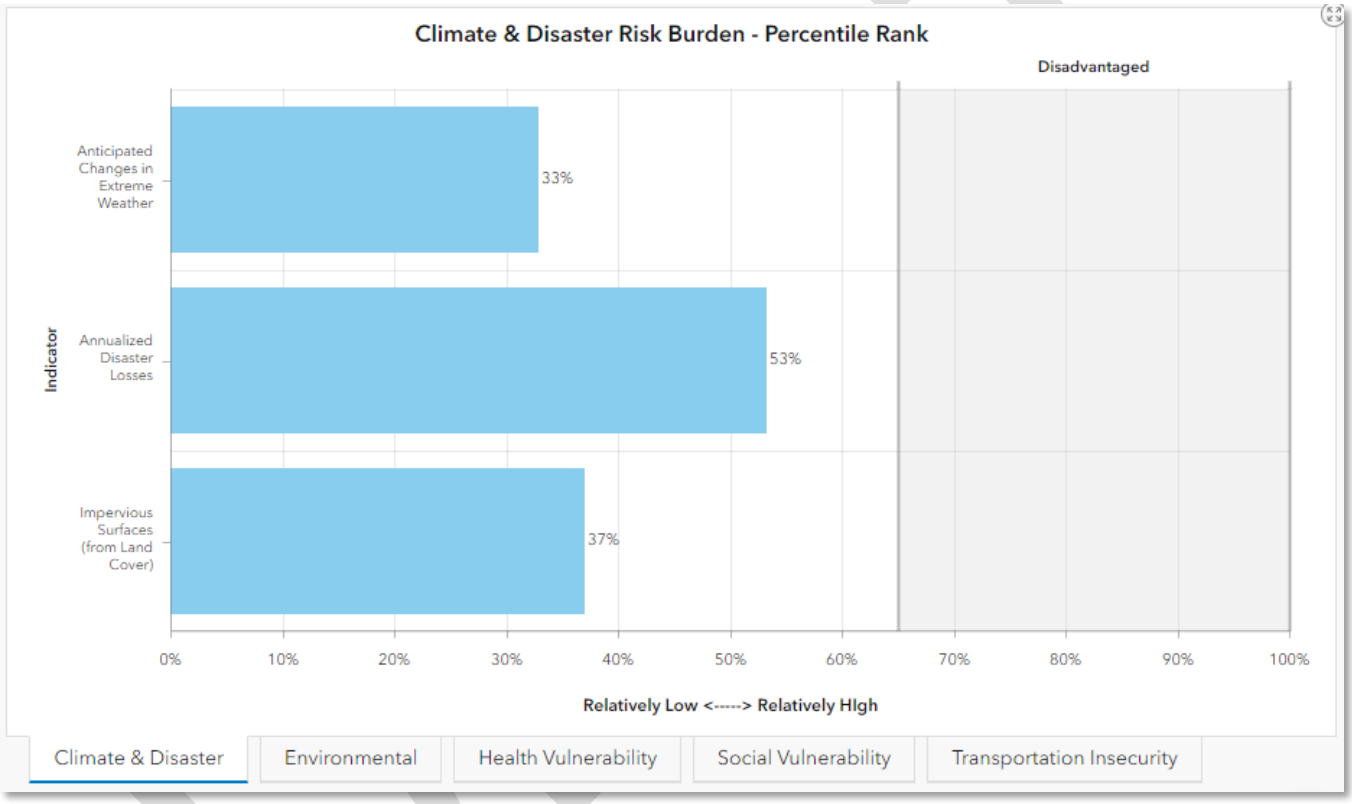


APPENDIX

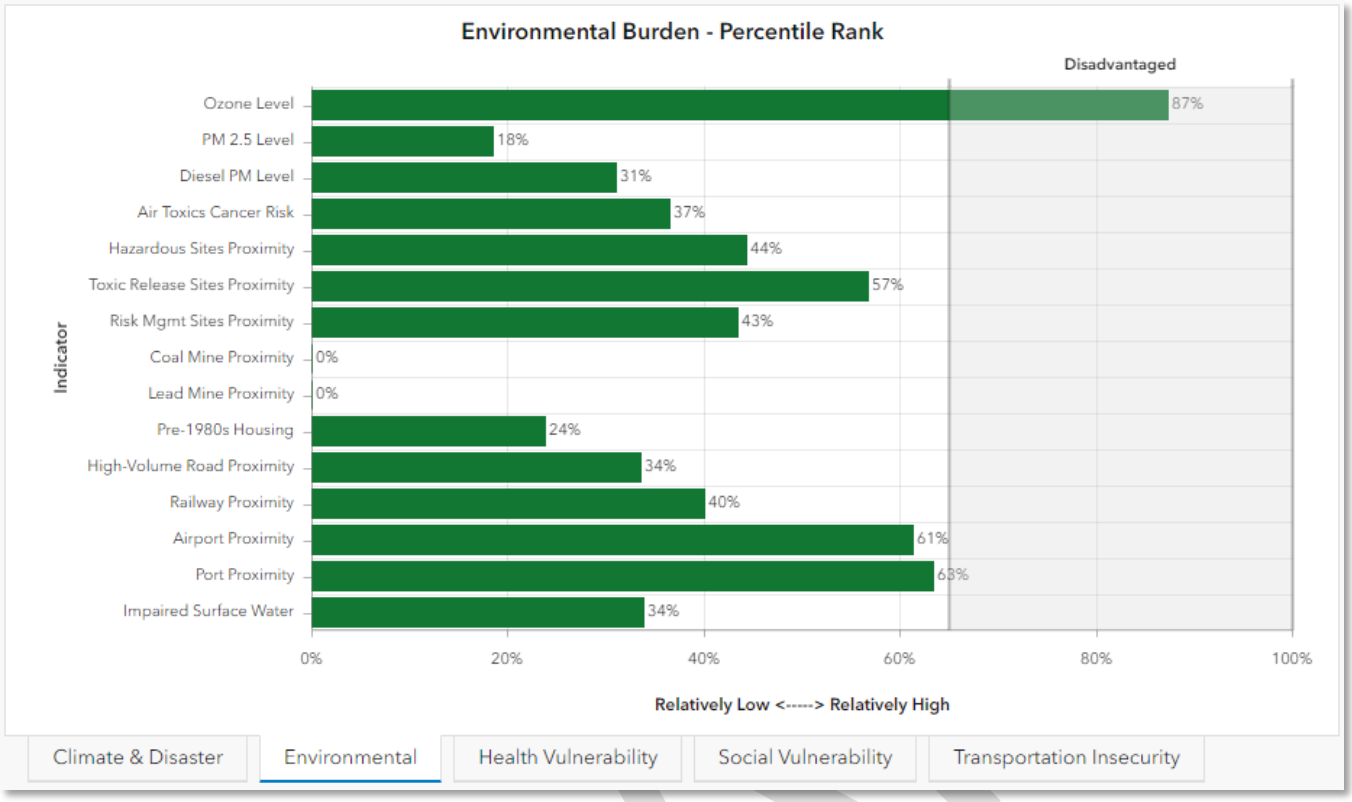
OTTAWA DISADVATANGED COMMUNITIES

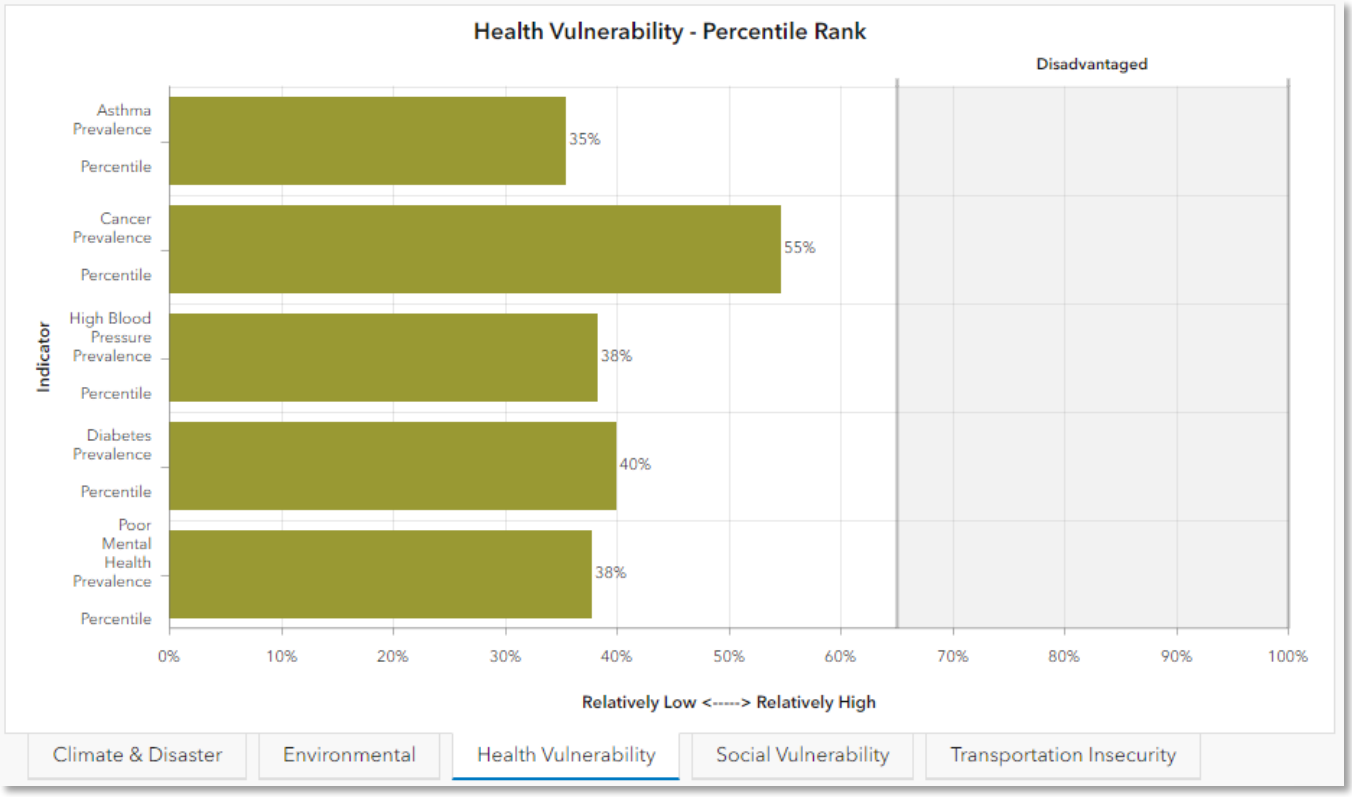


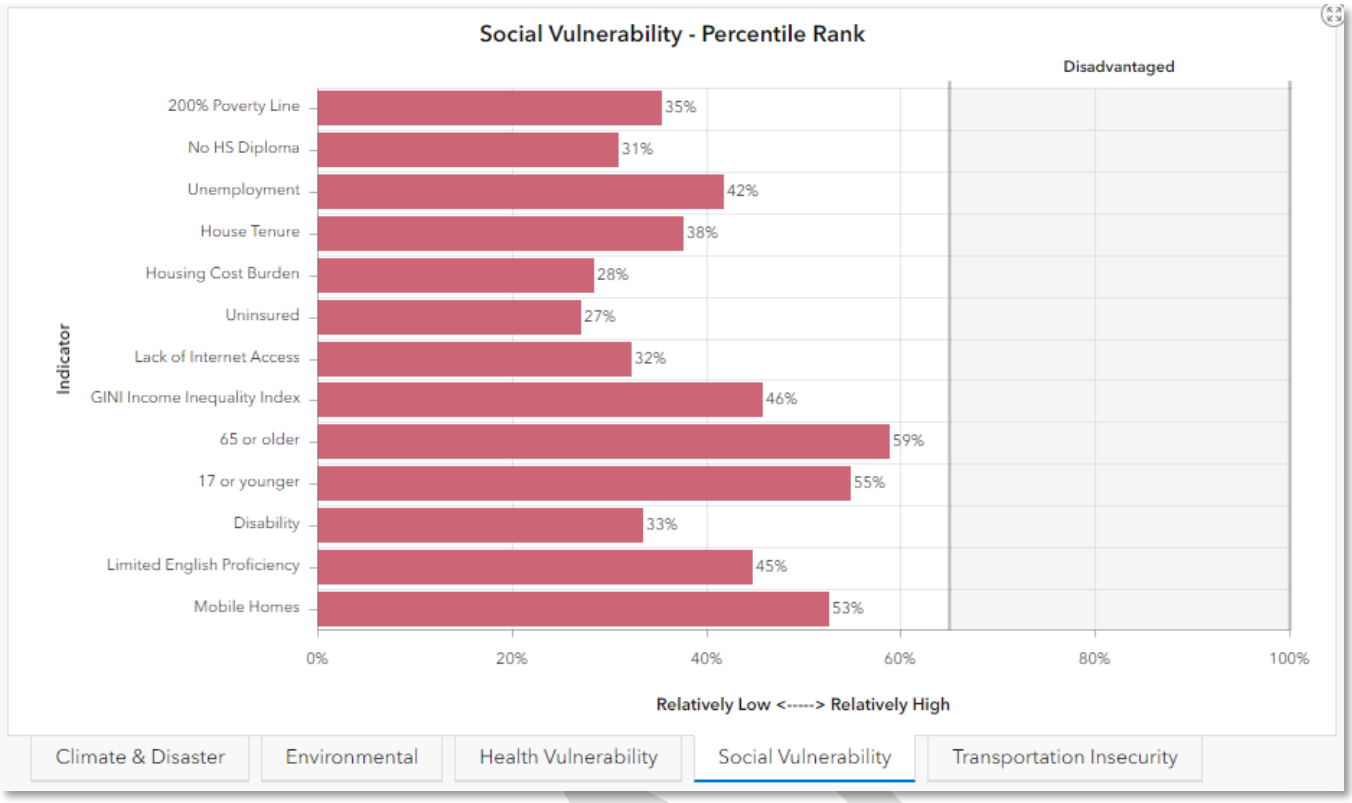

Overall Disadvantage Component Scores - Percentile Ranked
Disadvantaged
Climate & Disaster Risk Burden
Environmental Burden
Health Vulnerability
Social Vulnerability
Transportation Insecurity
Components
29%
50%
39%
32%
63%
0%
20%
40%
60%
80%
100%
Relatively Low <-----> Relatively High

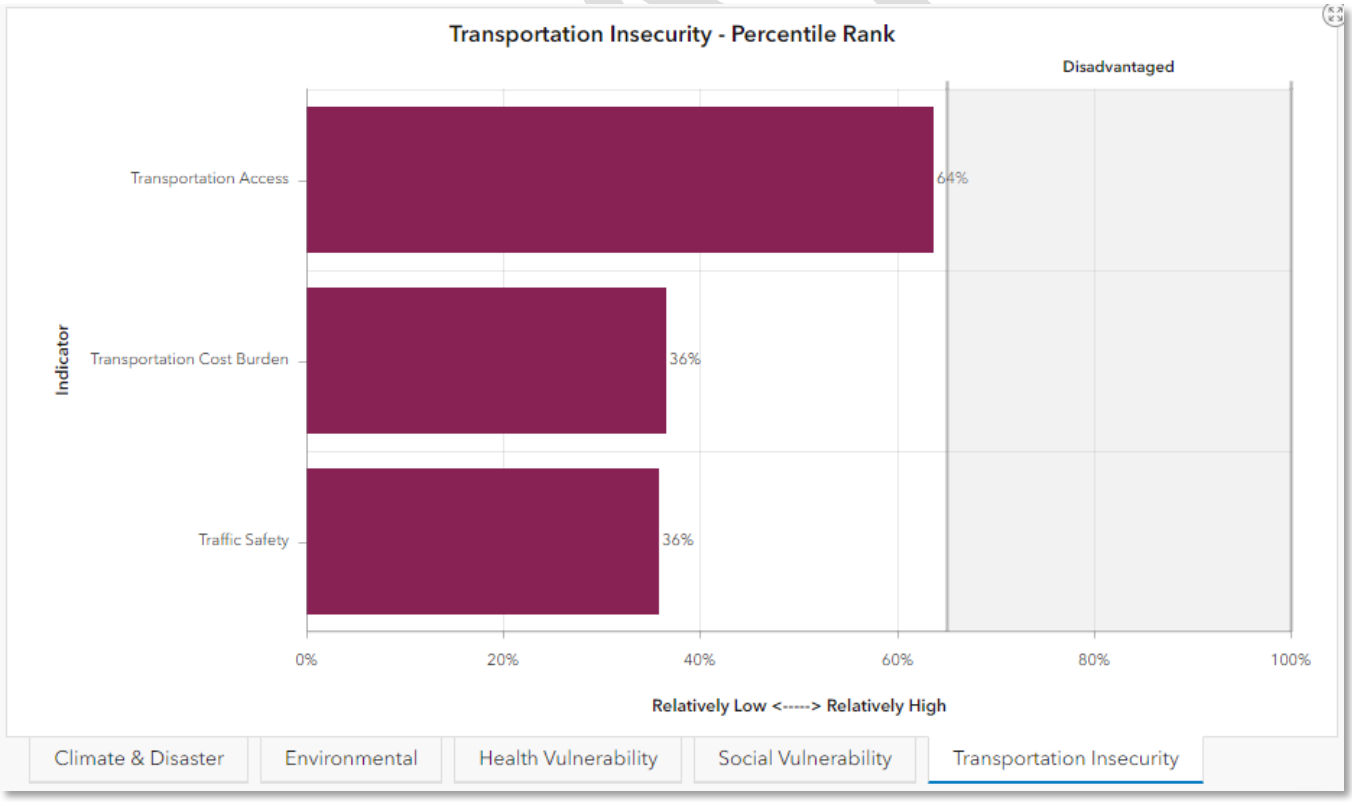

Climate & Disaster Risk Burden - Percentile Rank
Disadvantaged
Anticipated Changes in Extreme Weather
Annualized Disaster Losses
Impervious Surfaces (from Land Cover)
Indicator
33%
53%
37%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Relatively Low <-----> Relatively HIgh
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity

APPENDIX


Environmental Burden - Percentile Rank
Disadvantaged
Ozone Level
PM 2.5 Level
Diesel PM Level
Air Toxics Cancer Risk
Hazardous Sites Proximity
Toxic Release Sites Proximity
Risk Mgmt Sites Proximity
Coal Mine Proximity
Lead Mine Proximity
Pre-1980s Housing
High-Volume Road Proximity
Railway Proximity
Airport Proximity
Port Proximity
Impaired Surface Water
87%
18%
31%
37%
44%
57%
43%
0%
0%
24%
34%
40%
61%
63%
34%
Indicator
0%
20%
40%
60%
80%
100%
Relatively Low <-----> Relatively High
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity


Health Vulnerability - Percentile Rank
Disadvantaged
Asthma Prevalence Percentile
Cancer Prevalence Percentile
High Blood Pressure Prevalence Percentile
Diabetes Prevalence Percentile
Poor Mental Health Prevalence Percentile
35%
55%
38%
40%
38%
Indicator
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Relatively Low <-----> Relatively High
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity


Social Vulnerability - Percentile Rank
Disadvantaged
200% Poverty Line
No HS Diploma
Unemployment
House Tenure
Housing Cost Burden
Uninsured
Lack of Internet Access
GINI Income Inequality Index
65 or older
17 or younger
Disability
Limited English Proficiency
Mobile Homes
35%
31%
42%
38%
28%
27%
32%
46%
59%
55%
33%
45%
53%
Indicator
0%
20%
40%
60%
80%
100%
Relatively Low <-----> Relatively High
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity

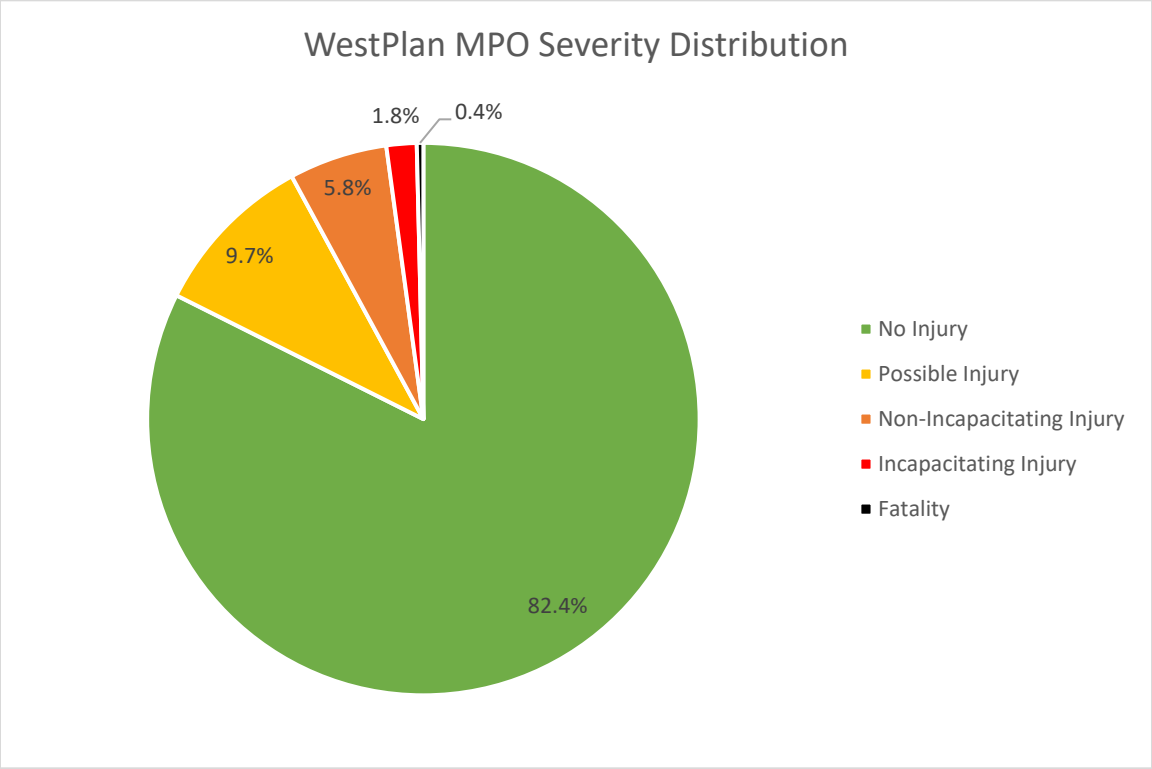

Transportation Insecurity - Percentile Rank
Disadvantaged
Transportation Access
Transportation Cost Burden
Traffic Safety
64%
36%
36%
Indicator
0%
20%
40%
60%
80%
100%
Relatively Low <-----> Relatively High
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity

APPENDIX

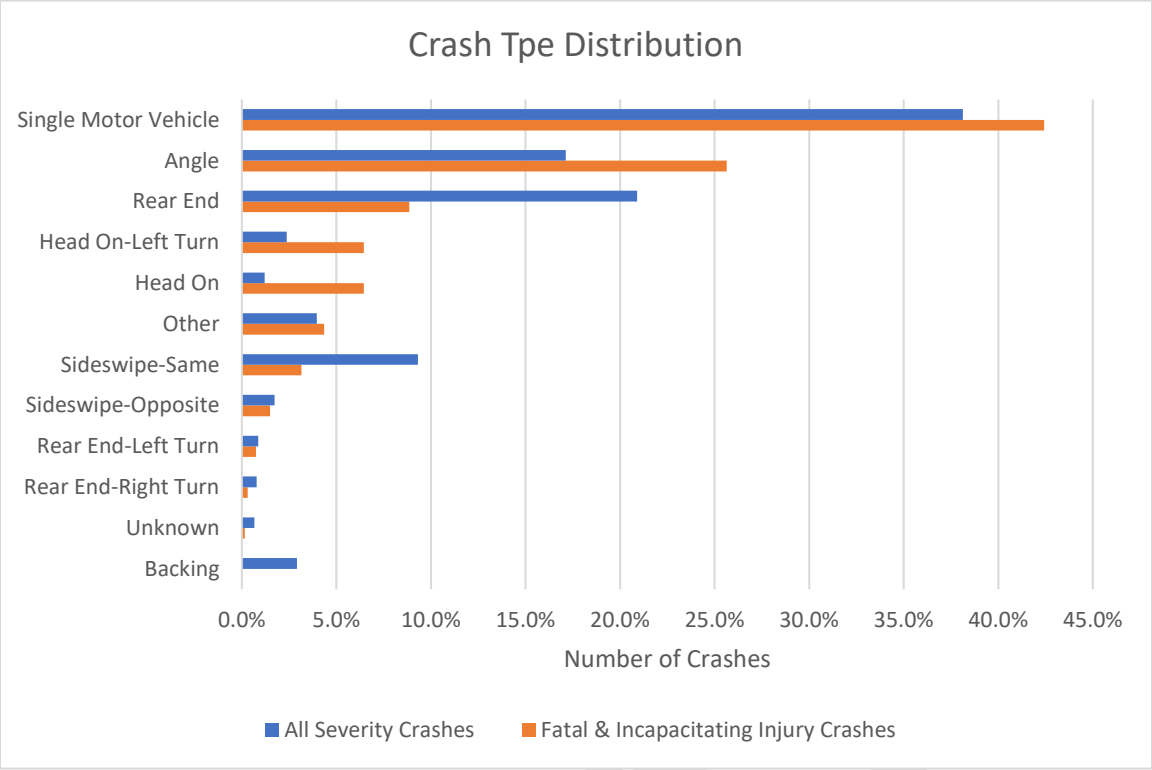
WESTPLAN MPO - COMBINED

CRASH SUMMARY (2018 – 2022)

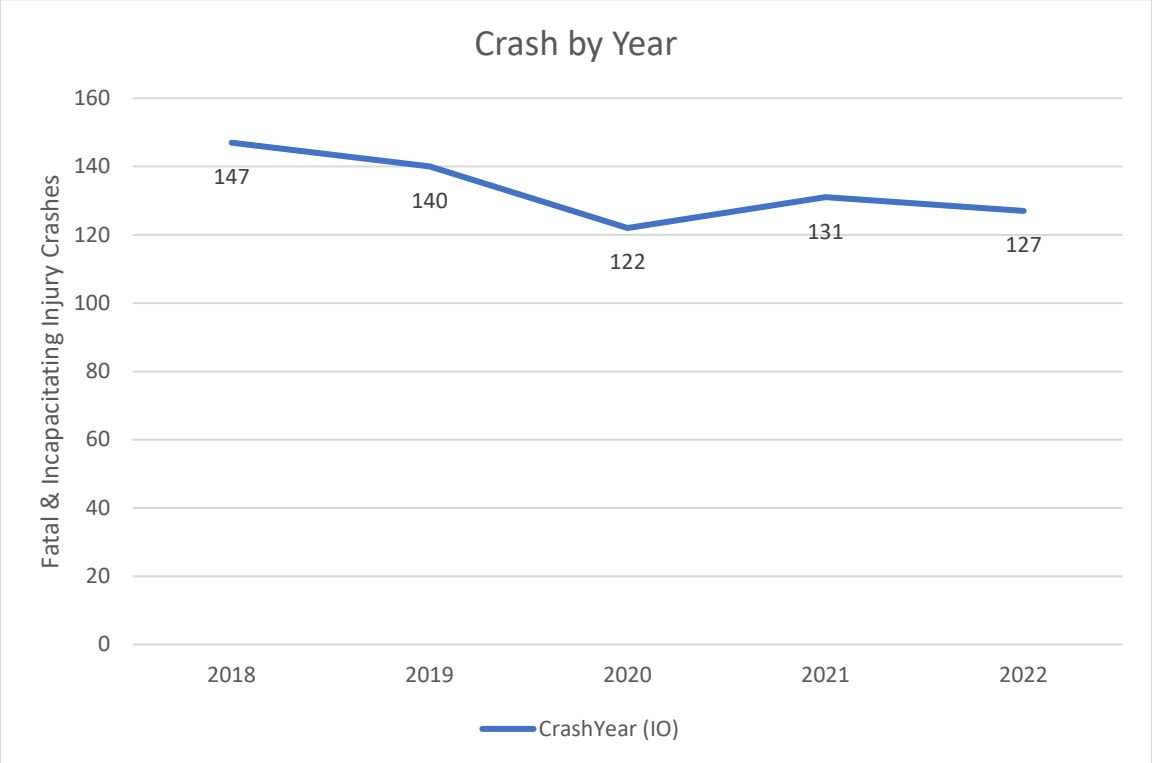
SEVERITY



TYPE

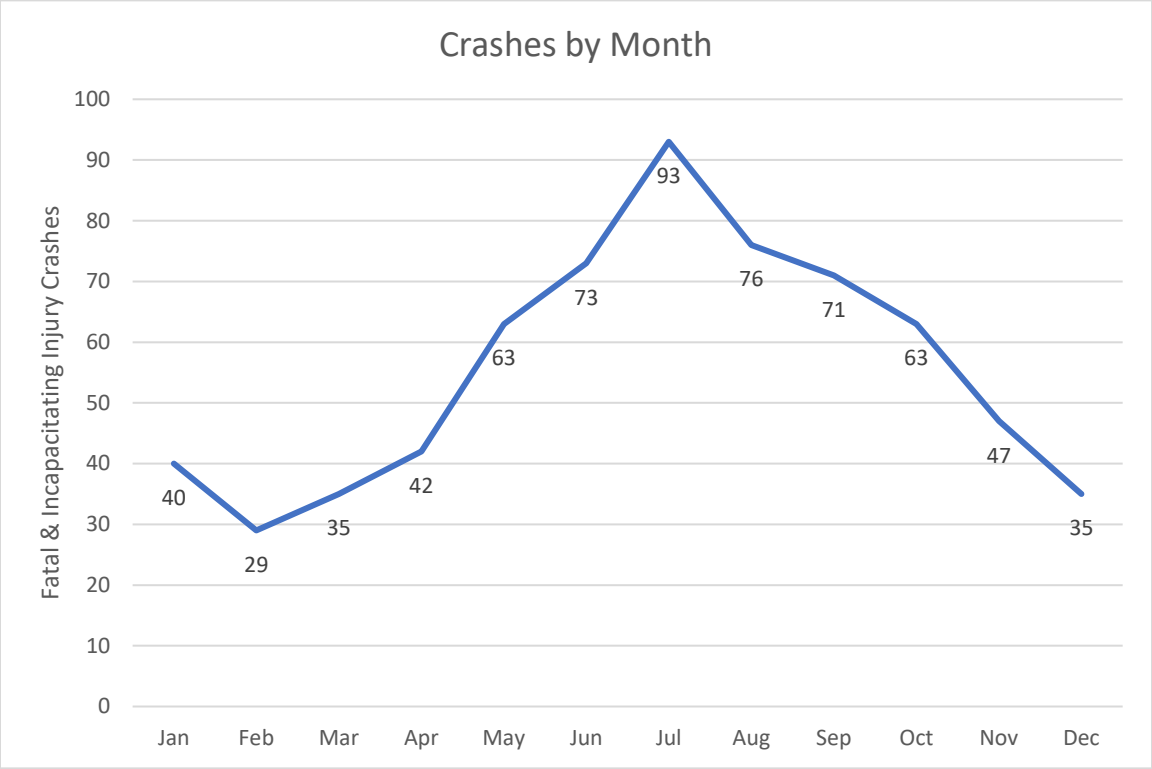

Crash Tpe Distribution
Single Motor Vehicle
Angle
Rear End
Head On-Left Turn
Head On
Other
Sideswipe-Same
Sideswipe-Opposite
Rear End-Left Turn
Rear End-Right Turn
Unknown
Backing
0.0%
5.0%
10.0%
15.0%
20.0%
25.0%
30.0%
35.0%
40.0%
45.0%
Number of Crashes
All Severity Crashes
Fatal & Incapacitating Injury Crashes

YEAR

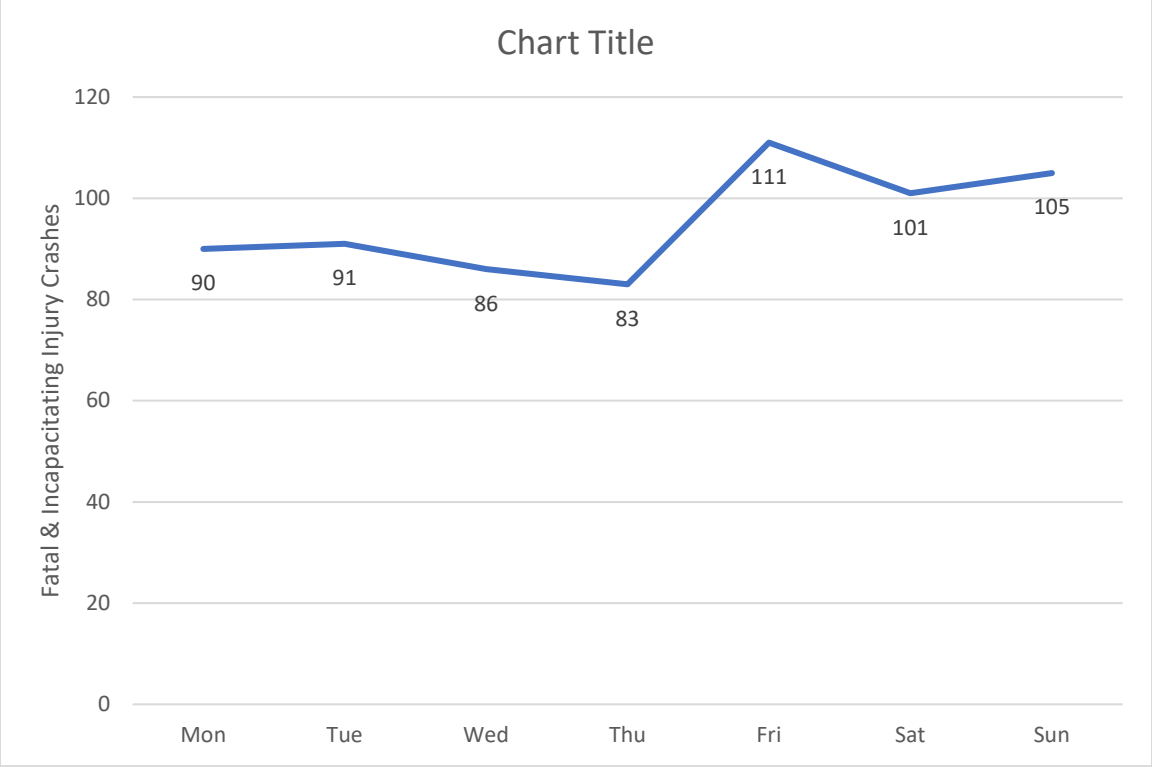

Crash by Year
Fatal & Incapacitating Injury Crashes
160
140
120
100
80
60
40
20
0
147
140
122
131
127
2018
2019
2020
2021
2022
CrashYear (IO)

APPENDIX

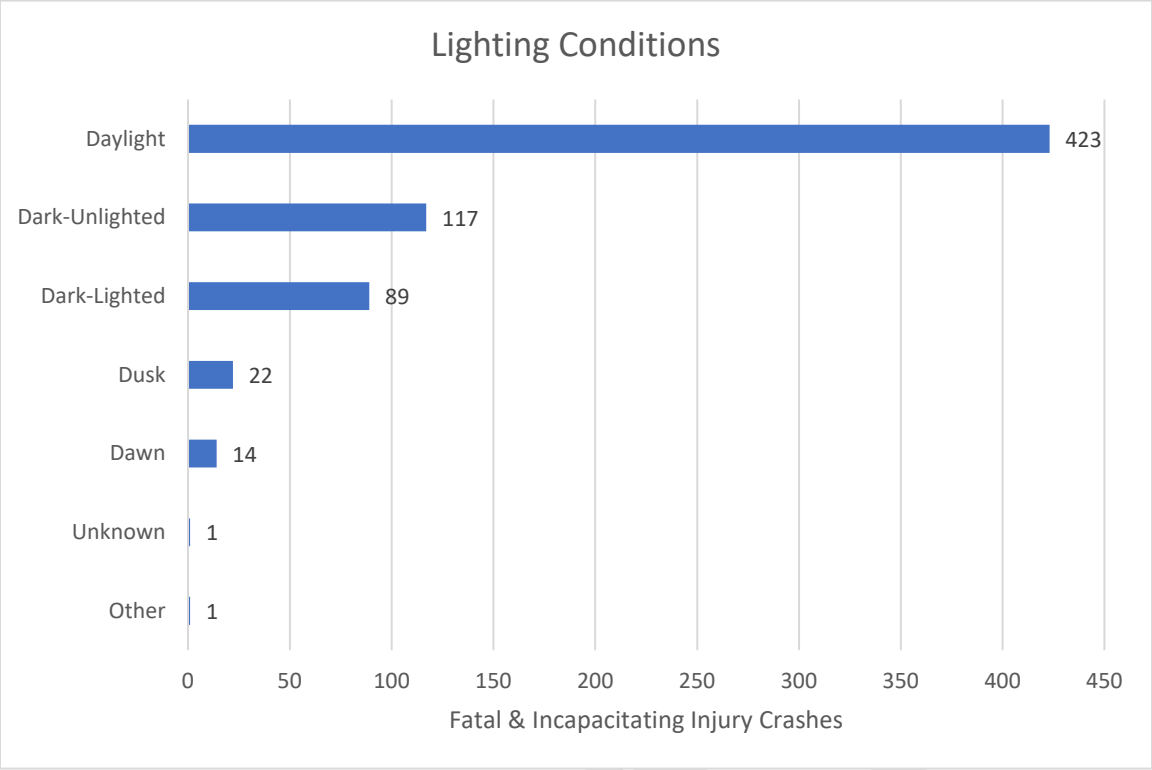
MONTH



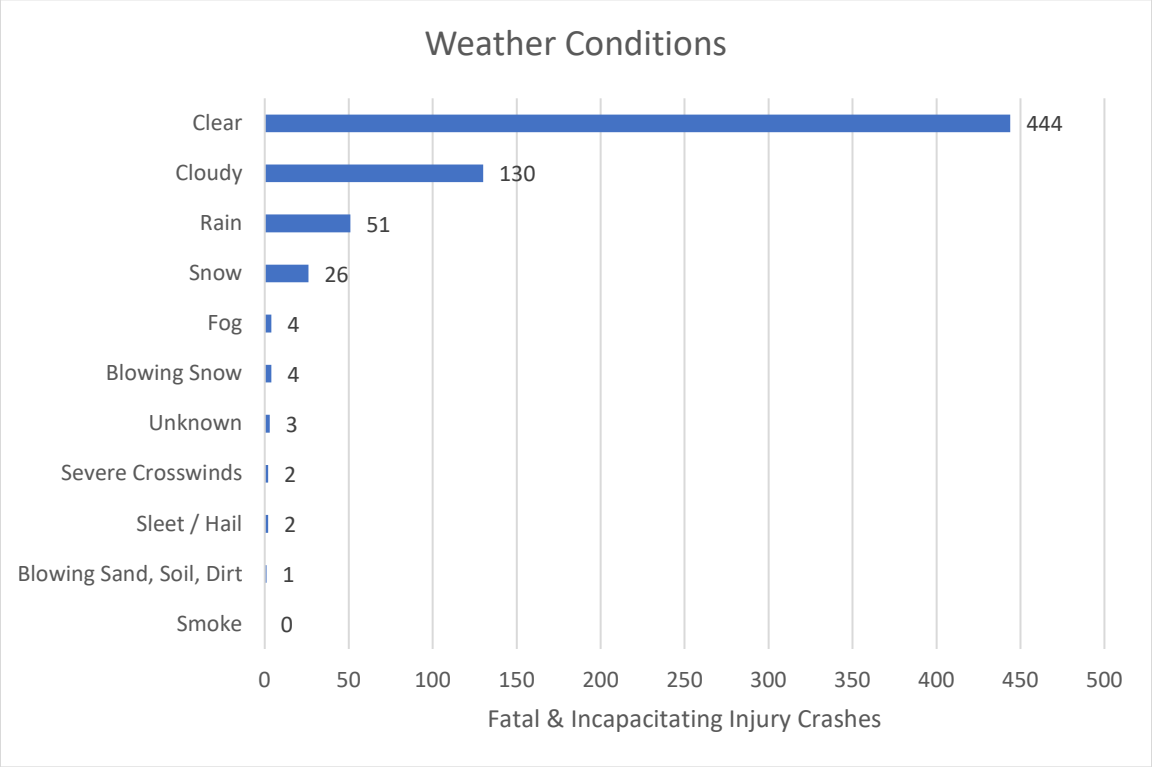
WEEKDAY



LIGHTING CONDITIONS

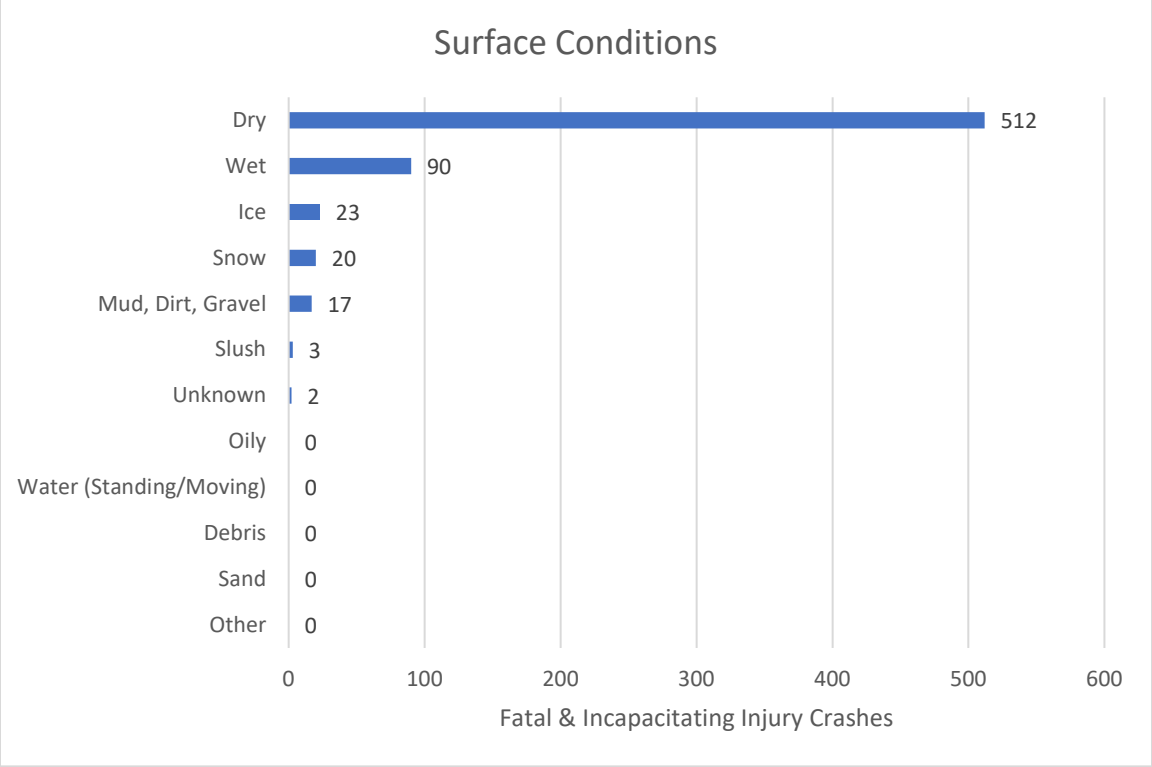


WEATHER CONDITIONS

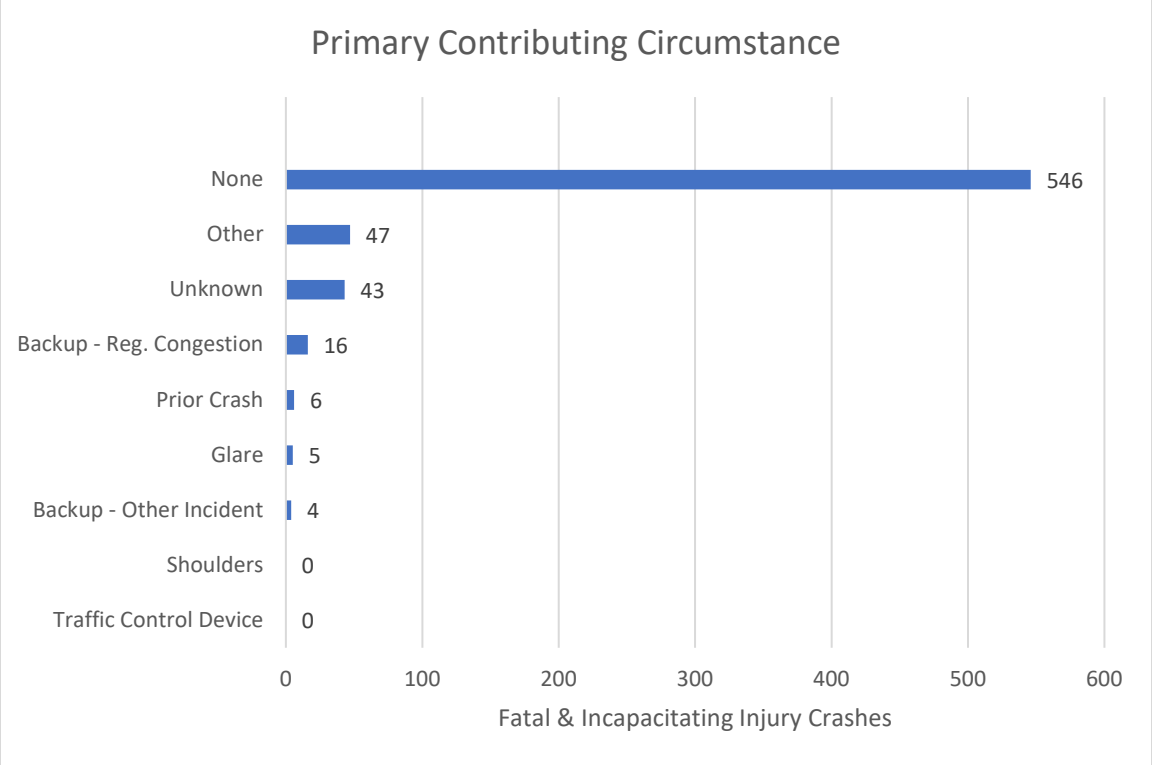


APPENDIX

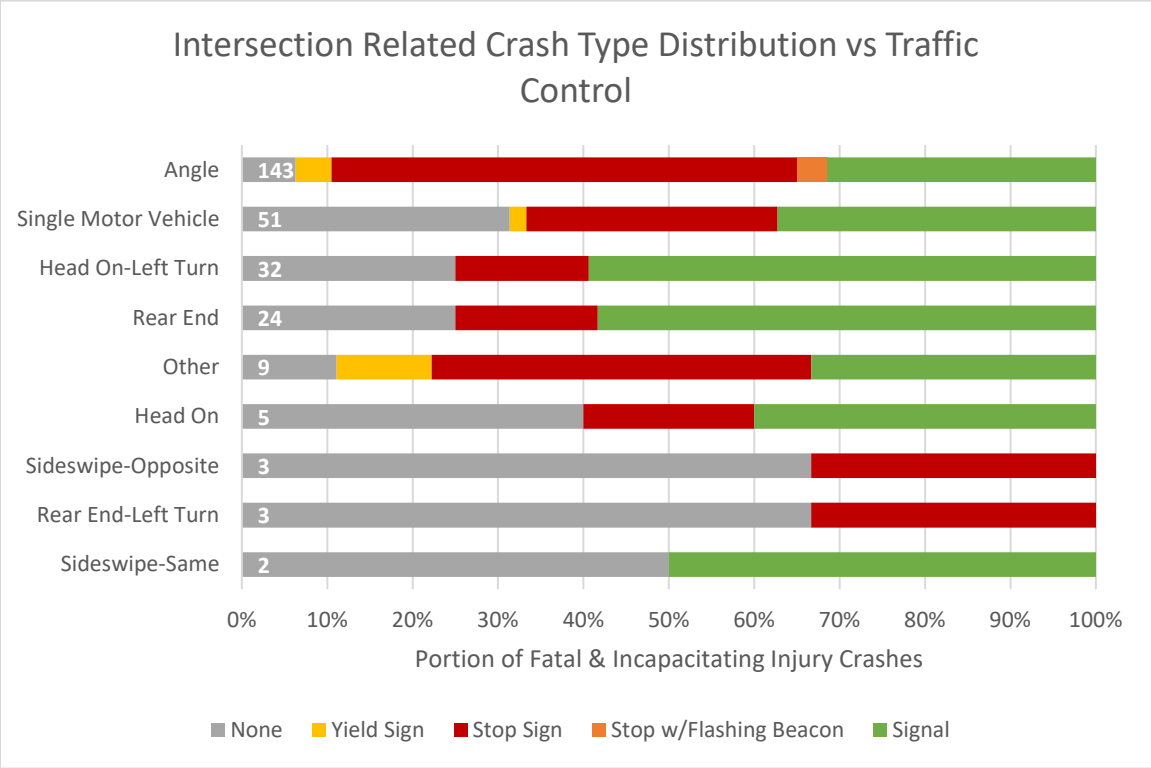
SURFACE CONDITIONS



CONTRIBUTING CIRCUMSTANCES

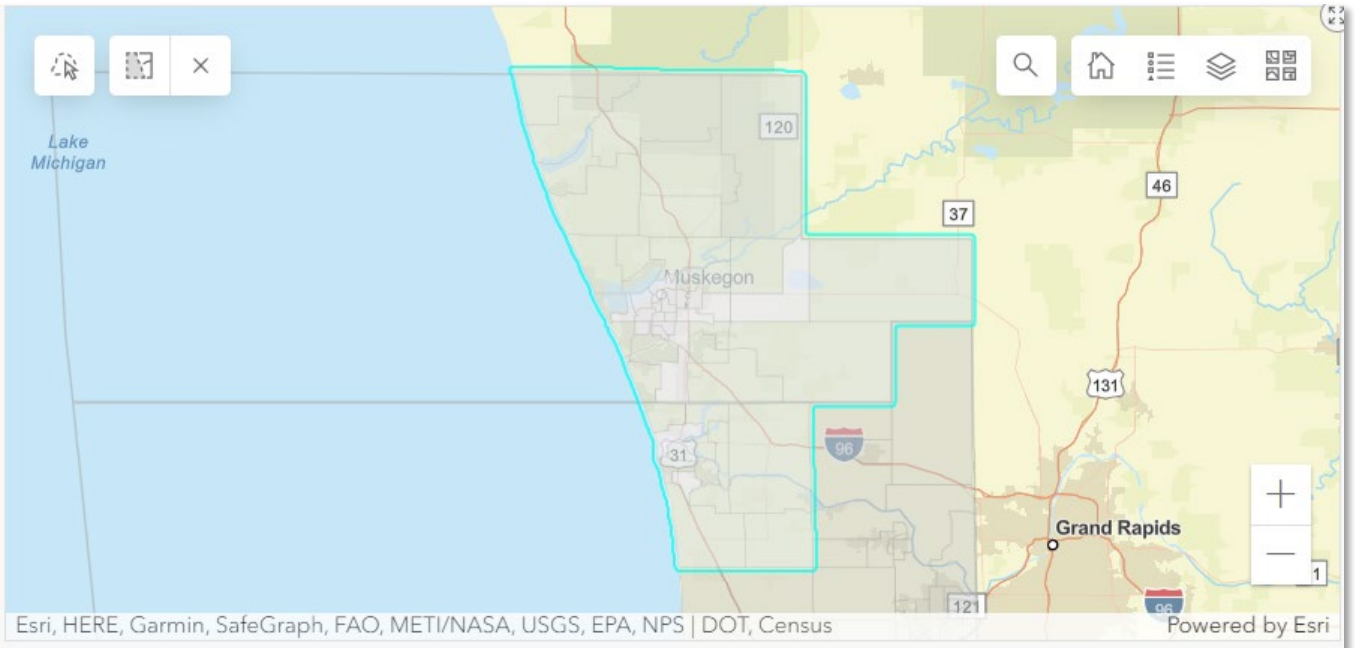


INTERSECTION CRASH TYPES

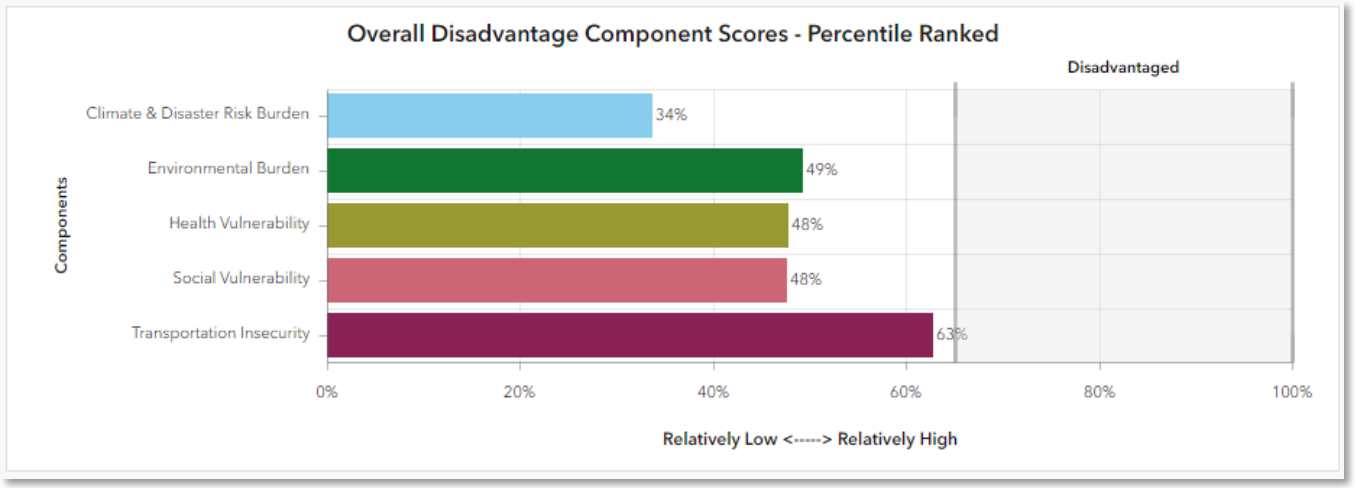


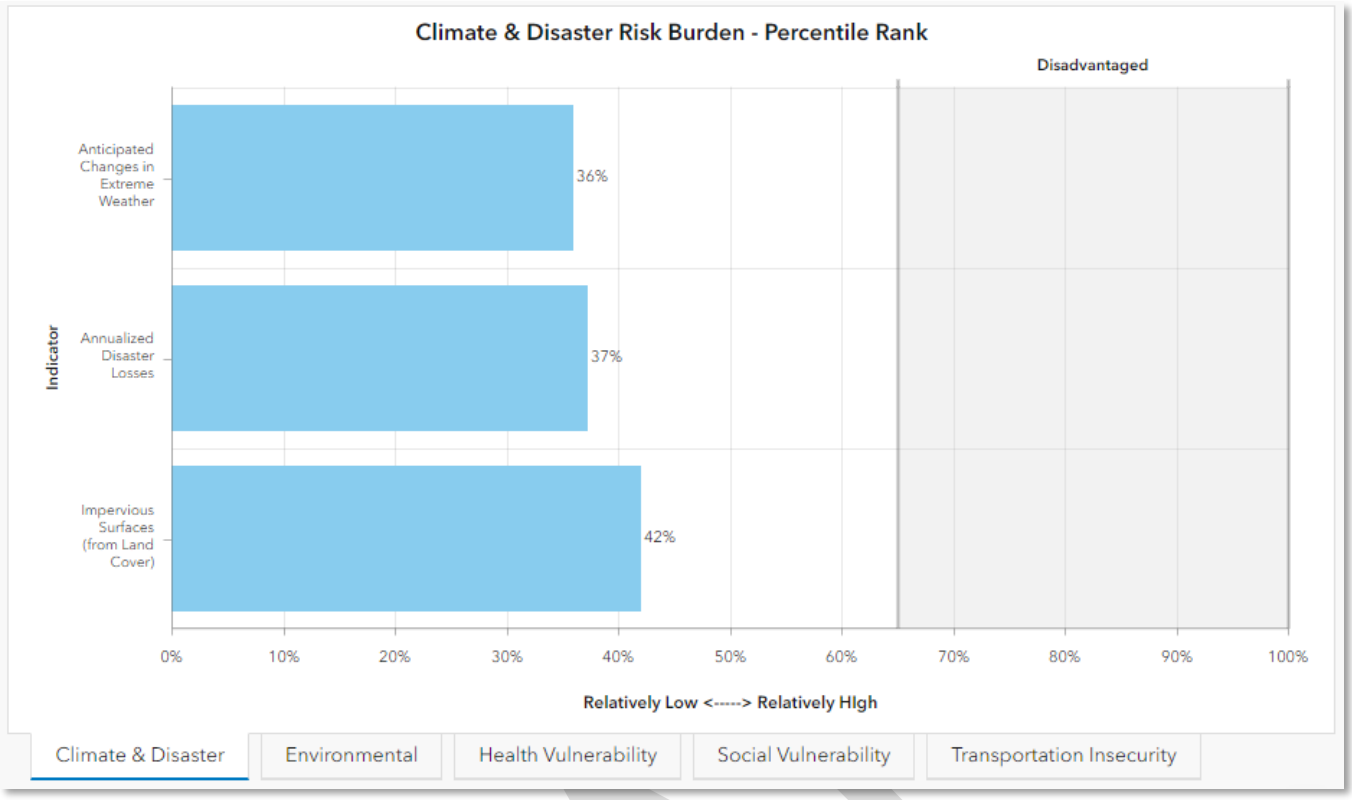
APPENDIX

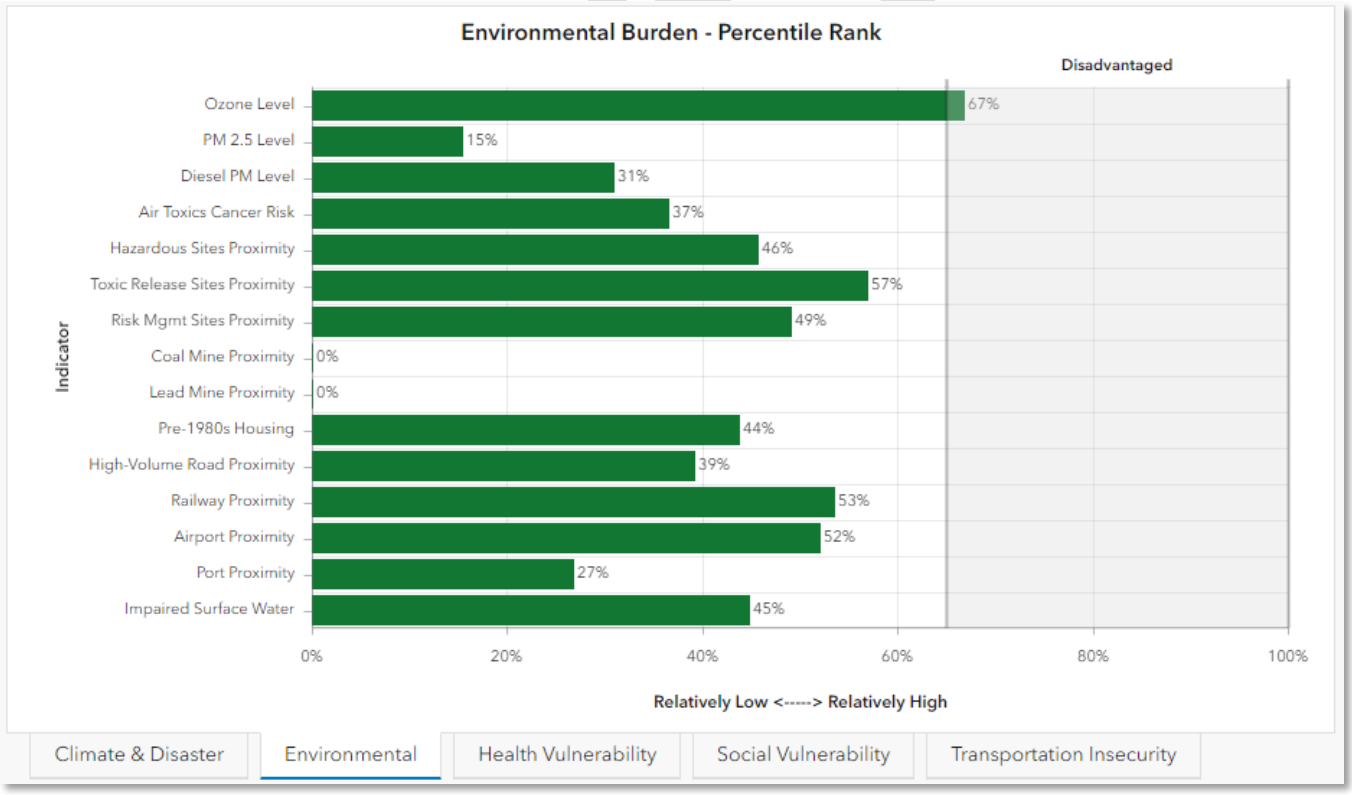
WESTPLAN MPO DISADVATANGED COMMUNITIES



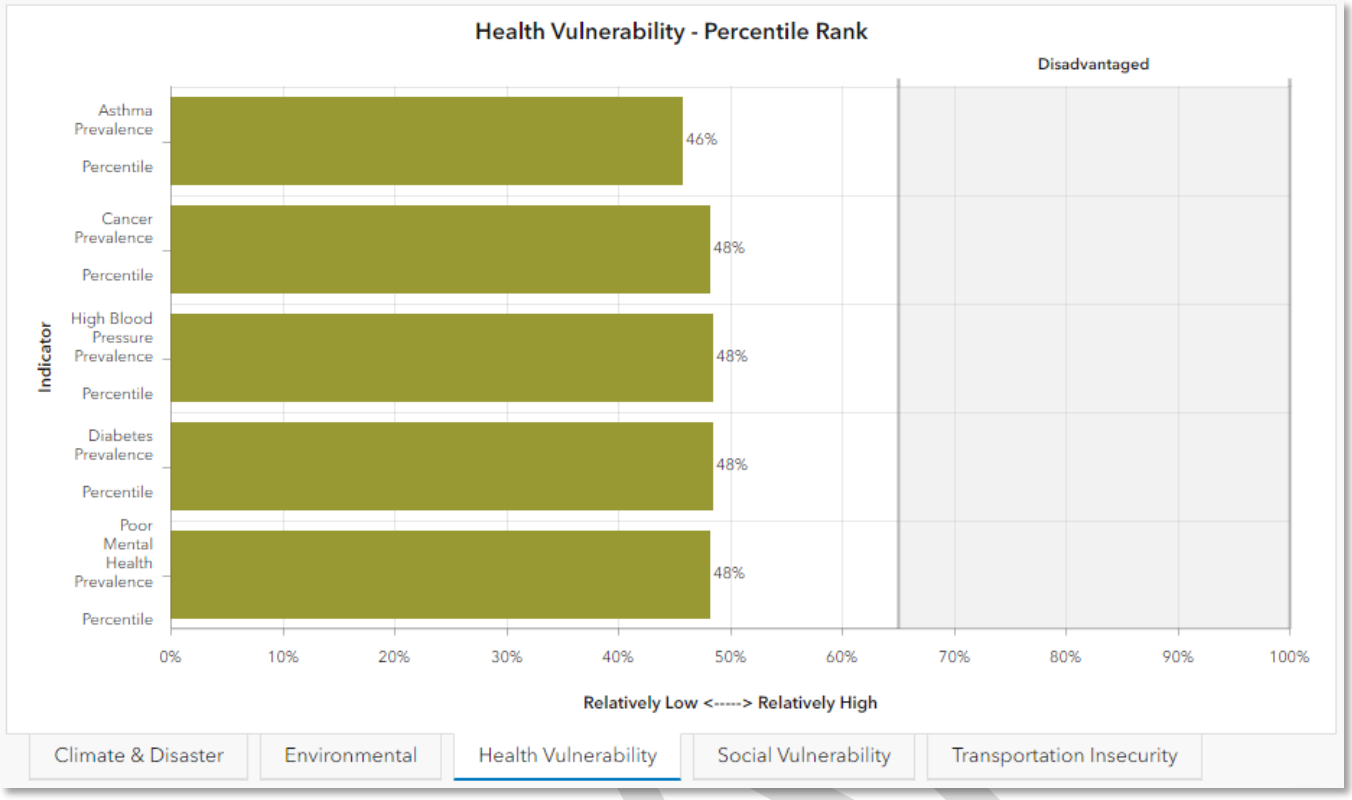
Total Population Living in	Total Population Living in Disadvantaged Census Tracts in	% of Disadvantaged Census Tracts in the Selected Project
231k	73.8k	36%

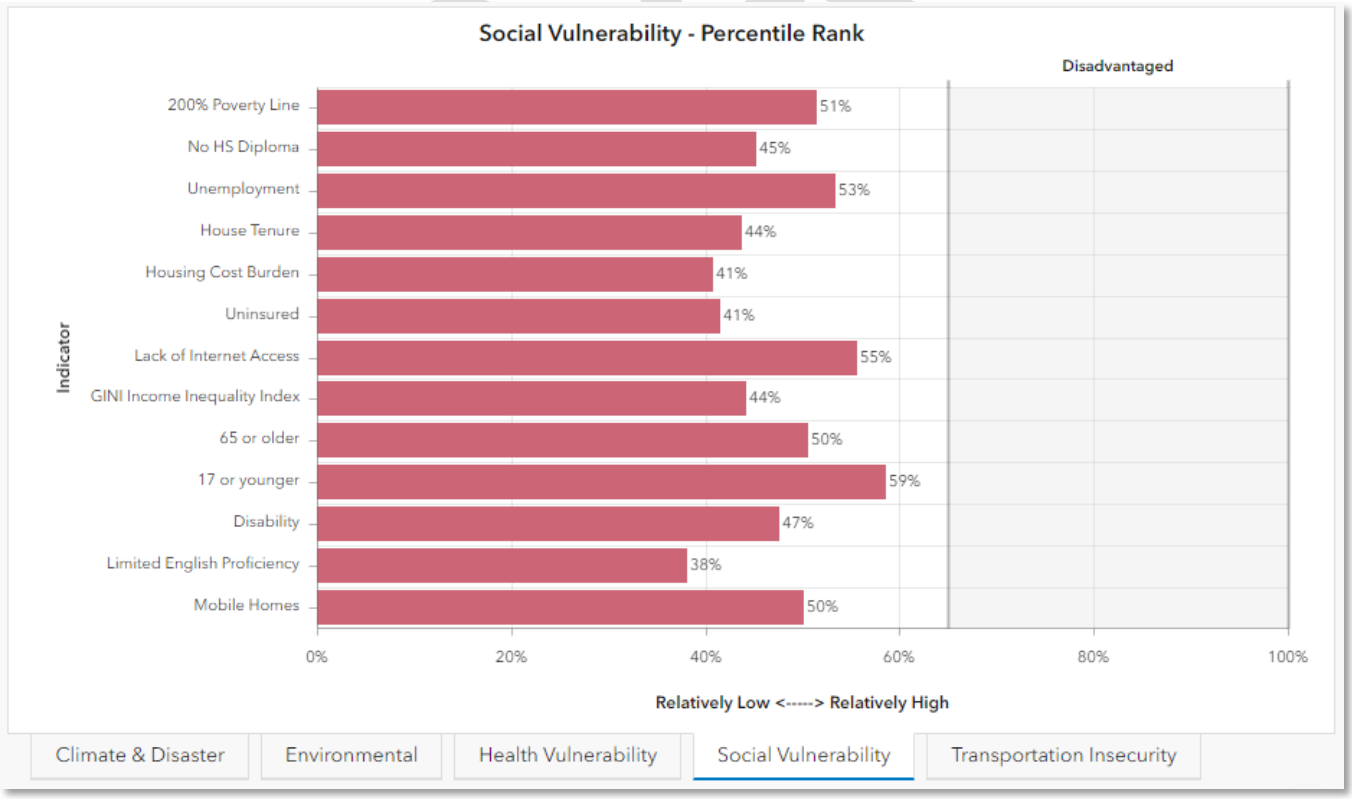


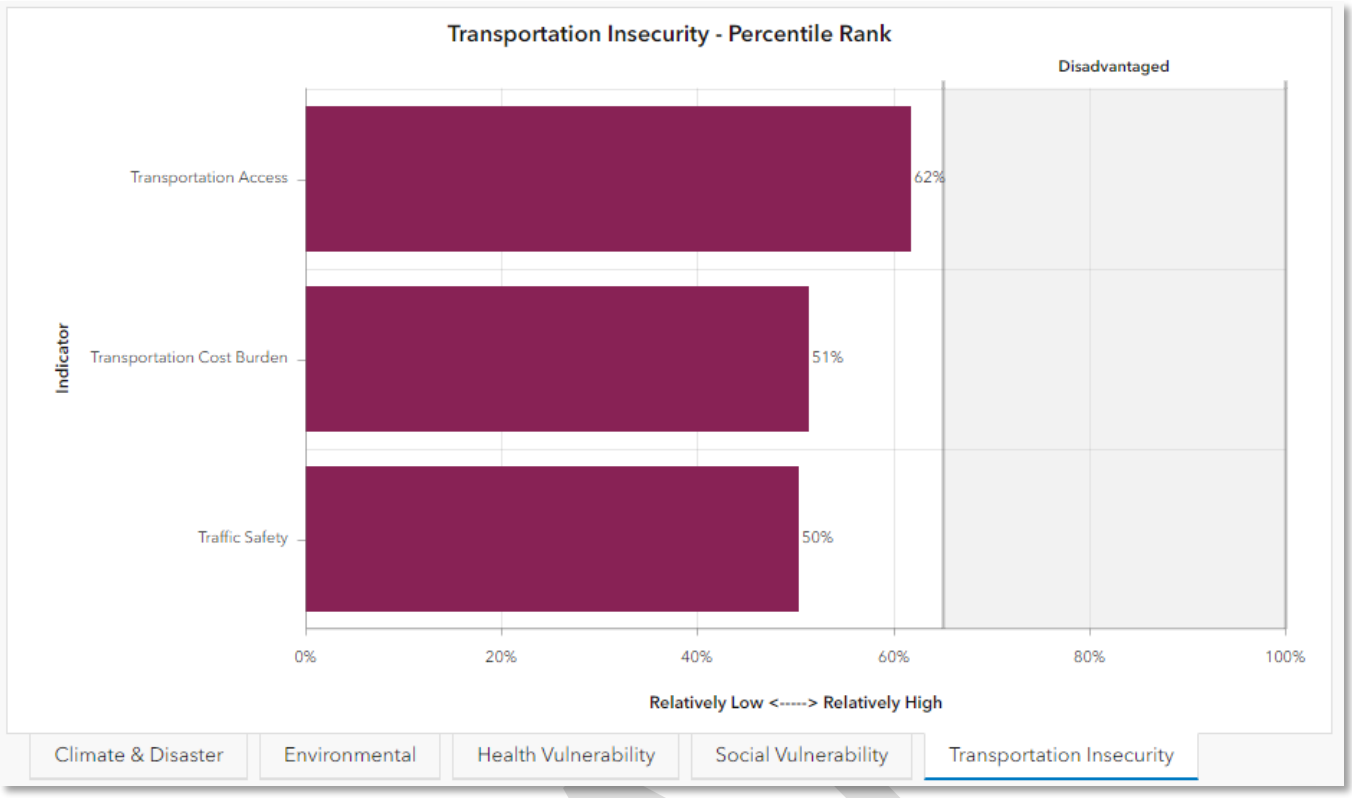

Climate & Disaster Risk Burden - Percentile Rank
Disadvantaged
Anticipated Changes in Extreme Weather
36%
Annualized Disaster Losses
37%
Impervious Surfaces (from Land Cover)
42%
Indicator
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Relatively Low <-----> Relatively HIgh
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity


Environmental Burden - Percentile Rank
Disadvantaged
Ozone Level
67%
PM 2.5 Level
15%
Diesel PM Level
31%
Air Toxics Cancer Risk
37%
Hazardous Sites Proximity
46%
Toxic Release Sites Proximity
57%
Risk Mgmt Sites Proximity
49%
Coal Mine Proximity
0%
Lead Mine Proximity
0%
Pre-1980s Housing
44%
High-Volume Road Proximity
39%
Railway Proximity
53%
Airport Proximity
52%
Port Proximity
27%
Impaired Surface Water
45%
Indicator
0%
20%
40%
60%
80%
100%
Relatively Low <-----> Relatively High
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity

APPENDIX


Health Vulnerability - Percentile Rank
Disadvantaged
Indicator
Asthma Prevalence Percentile
Cancer Prevalence Percentile
High Blood Pressure Prevalence Percentile
Diabetes Prevalence Percentile
Poor Mental Health Prevalence Percentile
46%
48%
48%
48%
48%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Relatively Low <-----> Relatively High
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity


Social Vulnerability - Percentile Rank
Disadvantaged
Indicator
200% Poverty Line
No HS Diploma
Unemployment
House Tenure
Housing Cost Burden
Uninsured
Lack of Internet Access
GINI Income Inequality Index
65 or older
17 or younger
Disability
Limited English Proficiency
Mobile Homes
51%
45%
53%
44%
41%
41%
55%
44%
50%
59%
47%
38%
50%
0%
20%
40%
60%
80%
100%
Relatively Low <-----> Relatively High
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity


Transportation Insecurity - Percentile Rank
Disadvantaged
Transportation Access
62%
Transportation Cost Burden
51%
Traffic Safety
50%
Indicator
0%
20%
40%
60%
80%
100%
Relatively Low <-----> Relatively High
Climate & Disaster
Environmental
Health Vulnerability
Social Vulnerability
Transportation Insecurity

A-2 STAKEHOLDER ENGAGEMENT

1ST STAKEHOLDER MEETING ATTENDANCE (7/13/2023)

- Block, Matt — MDOT – Muskegon TSC
- Brodeur, Paige — MDOT – Grand Region
- Bubar, Gary — AAA – Traffic Safety
- Cleveland, Mark — Egelston Township Fire Department
- Cook, Lance — Michigan State Police
- Dornbush, Thea — Muskegon Township Fire Department
- Eldridge, Patrick — WSP
- Gajdos, Derek — City of Grand Haven
- Glotzbach, Dave — Muskegon Township Fire Department & TIM's Team
- Hoofman, Donna — MDOT Grand Region
- Jiang, Yafeng — MDOT – Safety Programs
- Johnson, Robert — WMSRDC
- Kent, Tyler — MDOT – Grand Region
- Knop, Joseph — Blue Lake Township Fire Department
- Marcinkowski, Jeff — Fruitland Township
- McPherson, Phil — Pioneer Resources
- Montgomery, Jill — Public Health
- Mulder, Suzanne — MDOT – Muskegon TSC
- Mulnix, Brian — WMSRDC
- Schneider, Tim — MDOT – WMTOC
- Stephens, Mike — Michigan State Police
- VandenBosch, Wade — Muskegon County Public Works
- Walters, Luke — MDOT
- Eldridge, Patrick — WSP

2ND STAKEHOLDER MEETING ATTENDANCE (9/5/2023)

- Bubar, Gary — AAA – Traffic Safety
- Fitzpatrick, Joel — WMSRDC (WestPlan MPO)
- Hermanson, Kaitlin — The Health Project
- Johnson, Robert — WMSRDC (WestPlan MPO)
- Kent, Tyler — MDOT – Grand Region
- Knop, Joseph — Blue Lake Township Fire Department
- McPherson, Phil — Pioneer Resources
- McQuiston, Carissa — MDOT
- Mulder, Suzanne — MDOT – Muskegon TSC
- Mulnix, Brian — WMSRDC
- Walters, Luke — MDOT
- Eldridge, Patrick — WSP

APPENDIX

STAKEHOLDER MEETING QUESTIONS & RESPONSE

The following is a summary of questions received during both stakeholder meetings and responses provided. Where appropriate additional context is provided here following review of available crash data and incorporated into the Safety Action Plan.

1. **Where does Distracted Driving fall into the categories?**
    a. Distracted driving is included under the Crash Attributes. Based on stakeholder feedback and supporting crash data, the Speeding Emphasis Area has been expanded to include Driver Behavior, such as distracted driving and cell phone use in addition to speed related crashes. This will be further interrogated for the final safety plan.
2. **Do you have information on underlying causes of crashes? That information would be beneficial to us in Public Health.**
    a. Hazardous actions and Contributing Factors are crash attributes we consider in addition to the other characteristics such as lighting, roadway surface condition, etc. These have been considered at a preliminary level and can be include in more detail in the final report for each Emphasis Area as feasible.
3. **Perhaps break out motorcyclist crashes?**
    a. Additional analysis regarding crashes by vehicle type was completed and Motorcycle Involved crashes have been added as an Emphasis area based both on stakeholder feedback and supporting data.
4. **There seems to be an increase in the frequency of rural high speed intersection crashes, failure to yield, and failure to stop crashes.**
    a. While speed involved crashes did not appear to make up a significant portion of reported fatal and incapacitating injury crashes, speeding in general is included under the Driver Behavior Emphasis Area and will be further interrogated as the Intersection Crash Emphasis Area is further developed in the final safety plan.
5. **Does the data identify if severe crashes are secondary to an ongoing traffic incident?**
    a. Yes, however the number of crashes identified as following a previous crash or other incident on the network was relatively small (27/31,007 crashes of all severities) with no fatal or incapacitating injury crashes resulting from a secondary event as reported in the data.
6. **I saw a statistic that said more persons of color were involved in crashes. Where would this data come from? Is crash data available by race?**
    a. Depending on the crash dataset, yes, we do have some driver demographic data as reported by responding officers. This attribute was not included in crash reports prior to 2020 and has been noted with increasing frequency each year since. As such, the current crash dataset (2018-2022) has a partial set of driver demographic data we can attempt to interrogate further. More intensive equity outreach and engagement is anticipated to be completed by the WestPlan MPO to help enhance the preliminary discussions presented in final safety plan.
7. **When referring to transit access, in addition to the bus stop themselves does the plan consider access and stop location/distribution?**
    a. Yes, in addition to working to improve bus stop facilities review of transit need and service areas is recommended to respond to changes in traffic flow, community centers, and availability of crossing opportunities.

Public Comments Received Through Community Remarks

Category	Location Address	Location City	Comment
Bicycle safety	1209 W Giles Rd	Muskegon	Bike path from Whitehall Road to Horton and down to Mullally Park or River Rd
Bicycle safety	5445 Scenic Dr	Whitehall	Would love to see a non-motorized path leading from this point out to the White Lake channel and the lighthouse.
Pedestrian safety	8331 Old Channel Trl	Montague	The bike path need to be identified better for crossing, not safe!
Pedestrian safety	4542 Dowling St	Montague	It is dangeroua to cross the road
Pedestrian safety	4538 Dowling St	Montague	Very unsafe crossing for pedestrians and bikes. Needs pedestrian safety island.
Pedestrian safety	8718 Ferry St	Montague	Vehicles ignore pedestrian crossing - even when lights are blinking.
Pedestrian safety	4875 Dowling St	Montague	Unsafe student crossing - especially when dark outside in mornings, foggy, or snowing. Would benefit from blinking warning lights similar to located at Dowling and Ferry.
Pedestrian safety	4875 Dowling St	Montague	Definitely need a more obvious crossing alert for traffic - can be very unsafe for students crossing for school!
Pedestrian safety	4534 Dowling St	Montague	Need something so traffic is aware of crossing there. It’s like trying to play frogger to cross, especially in the summer!
Pedestrian safety	4538 Dowling St	Montague	Need something so traffic is aware of crossing there. It’s like trying to play frogger to cross, especially in the summer!
Pedestrian safety	9070 Dicey St	Montague	A sidewalk along Dicey would greatly improve the safety of children walking to the MACC.
Pedestrian safety	611 Scenic Dr	Muskegon	Scenic Dr. is very busy in the summer for Bicycle's and walkers. There is no shoulder on this road and makes for a dangerous situation.
Pedestrian safety	3915 Scenic Dr	Muskegon	Fenner Rd (Laketon Twp) to Duck Lake Rd (Fruitland Twp) - Scenic Drive Non-Motorized Path - Approximately 7 miles in length - east side of road - 10 feet in width - for driving and bicycle safety also.
Pedestrian safety	5292 S Shore Dr	Whitehall	Scenic Dr to White Lake Dr - Non-Motorized Path - for Driving and Bicycle Safety
Pedestrian safety	791 Dykstra Rd	Muskegon	Dykstra Road should have the Non-Motorized trail finished from Andree Road out to Whitehall Road and connected to the Fred Meijer Berry Junction Trail. This road is very busy and the speed is not conducive to walkers or bicyclers.
Pedestrian safety	1542 Scenic Dr	Muskegon	There is a significant increase in automobile traffic and non-motorized (walking, running, biking) pedestrian use of Scenic Drive during late spring, summer and early fall. A non-motorized bike path on Scenic Drive from the Winter Sports Complex to Pioneer Park or to Duck Lake State Park, or further would create a safe place for community to drive and see the beauty on Scenic Drive while others walk, run, or bike and safely take in the beauty as well.
Driving safety	Dowling St	Montague	Cars come to a rolling stop even when light is red. Seldom check for pedestrians.
Driving safety	4563 Dowling St	Montague	Vehicles frequently run red light when traveling up Dowling hill. Pedestrian sign with count-down could also help with vehicles trying to time light.
Driving safety	107	Muskegon	Blind corner onto Pontaluna from southbound ramp.
Driving safety	110B	Muskegon	Southbound exit to Airline. Poor vision onto Airline from ramp.
Driving safety	1500 Warner St	Whitehall	Possibly get someone to direct traffic here when the highschool and Howmet shift gets out. Haven't been here since Mears opened, but I'm sure it's still very busy causing very long backups.
Driving safety	3080 Colby Rd	Whitehall	Encourage businesses to share one driveway onto busy road. So many intersections and conflict points that cause accidents.
Driving safety	I-96	Muskegon	Dangerous merge points, have to get from 25 to 70 in a few seconds
Driving safety	3255 Colby Rd	Whitehall	When turning right on red here (from walgreens/arbys), it's very hard to see traffic as there's a big bush in the way blocking the view.
Driving safety	1399 N Green Creek Rd	Muskegon	I have lived on Giles Rd. for 8 years now. In that time I have personally witnessed 3 separate occasions where a vehicle heading north or south on Green Creek has blown the stop sign, and has almost been hot by traffic on Giles which has the right of way. I am very concerned about this intersection and think a blinking stop sign or something to mark that a stop is coming to hopefully prevent and decrease this issue from happening.

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Driving safety	199 N Lake St	Whitehall	Add right/left turn lane, this road gets backed up a lot, would help to have another turn lane so right turners don't get stuck behind someone turning left.
Driving safety			Unnecessary last second lane shift, connect both lanes to each other and remove/relocate the lane for the exit ramp.
Driving safety			Shoulder needs to be cut back to improve drainage. A large puddle always appears with snow melt or rain under the guardrail. Would be nice to have trees trimmed/removed to see traffic stopping at the light prior to making the curve. .
Driving safety			Shoulder needs to be cut back to improve drainage. A large puddle always appears with snow melt or rain under the guardrail. Would be nice to have trees trimmed/removed to see traffic stopping at the light prior to making the curve. .
Driving safety			Shoulder needs to be cut back to improve drainage. A large puddle always appears with snow melt or rain under the guardrail. Would be nice to have trees trimmed/removed to see traffic stopping at the light prior to making the curve. .
Driving safety			Leave Shoreline Drive 2 lanes! DO NOT allow the city to move forward with their “road diet” plans. I was never tested in the busy season, nor when holiday traffic caused US-31 backup. Data was intentionally not pulled during these times.
Driving safety			Install a proper left turn lane on west bound Giles to Northbound Whitehall. Straight thru traffic and left turn traffic often are intertwined with each other.
Driving safety			Install a proper left turn lane on west bound Giles to Northbound Whitehall. Straight thru traffic and left turn traffic often are intertwined with each other.
Maintenance issue	Hart-Montague Trail State Park	Whitehall	What started out as an art wall has now been festooned with so much graffiti that it just looks like crap. Please reconsider this entire concept.
Maintenance issue	2060 Horton Rd	Muskegon	Ditching for better drainage, multiple blockages because of unmaintained culverts at driveways, or ditches being filled in by homeowners.
Maintenance issue			Can we please get these 2 bridges repaired? Everytime I drive on it (especially when traveling east) I feel like my car is going to collapse

A-3 STRATEGY SUMMARY TABLE

	Emphasis Area	Strategy	Relative Cost	Relative Time Frame	Systemic
Intersection Sight Distance & Traffic Control	Sight Distance & Roadside Maintenance	Restrict Parking Near Intersections	Low	Mid-term (3-5yrs)	Y
		Reduce Visual Clutter on Intersection Approaches	Low	Short-Term (1-2yrs)	Y
		Review & Update Stop Bar Placement	Low	Short-Term (1-2yrs)	N
		Vegetation Trimming & Roadside Maintenance	Low	Short-Term (1-2yrs)	Y
		Acquire and/or Clear Intersection Sight Triangles	Moderate	Mid-term (3-5yrs)	N
		Increase Intersection Lighting	Moderate	Mid-term (3-5yrs)	Y
	Improve Traffic Control Visibility	Replace Worn or Faded Signs	Low	Short-Term (1-2yrs)	Y
		Trim Roadside Vegetation & Remove Obstructions	Low	Short-Term (1-2yrs)	Y
		Install Retroreflective Sheeting on Signposts	Low	Short-Term (1-2yrs)	Y
		Oversize Traffic Control Signs	Moderate	Short-Term (1-2yrs)	Y
		Double Stop Signs	Moderate	Short-Term (1-2yrs)	Y
		Install LED Stop Signs	Moderate	Short-Term (1-2yrs)	Y
		Install Intersection Lighting	Moderate	Mid-term (3-5yrs)	N
		Install Backplates with Retroreflective Tape	Moderate	Mid-term (3-5yrs)	Y
		Upgrade to Box Span Signal Layouts	High	Mid-term (3-5yrs)	N
		Review Signal Head Placements & Cone of Vision	Moderate	Mid-term (3-5yrs)	N
		Consider Supplemental Signals	Moderate	Mid-term (3-5yrs)	N
	Signal Detection	Dilemma Zone Detection	Moderate	Mid-term (3-5yrs)	N
		Dynamic All-Red Extension	Moderate	Mid-term (3-5yrs)	N
		Visual Based Detection	Moderate	Mid-term (3-5yrs)	Y
	Advanced Signage & Pavement Markings	Advanced Intersection / Signal Ahead Signs	Low	Short-Term (1-2yrs)	Y
		Intersection / Signal Ahead Beacon or LED Sign Border	Moderate	Short-Term (1-2yrs)	Y
		Advanced Route Pavement Markings	Low	Short-Term (1-2yrs)	N
	Transverse Rumble Strips		Low	Mid-term (3-5yrs)	Y
	Roundabouts		High	Long-term (5+yrs)	N

	Emphasis Area	Strategy	Relative Cost	Relative Time Frame	Systemic
Lane	Enhanced Curved Delineation	Advanced Curve Warning Signs	Low	Short-Term (1-2yrs)	Y
		Curve Chevron Delineation	Low	Short-Term (1-2yrs)	Y
		LED Curve Warning Signs	Moderate	Mid-term (3-5yrs)	Y

		Install Retroreflective Sheeting on Signposts	Low	Short-Term (1-2yrs)	Y
	Install or Expand Paved Shoulders	Install New Paved Shoulder	Moderate	Mid-term (3-5yrs)	N
		Widen Existing Paved Shoulder	Moderate	Mid-term (3-5yrs)	Y
		Safety Edge	Low	Short-Term (1-2yrs)	Y
	Review & Update Passing Lanes		Moderate	Mid-term (3-5yrs)	N
	High Friction Surface & Other Surface Treatments		Moderate	Mid-term (3-5yrs)	N
	Center & Edgeline Rumble Strips		Moderate	Mid-term (3-5yrs)	Y
	Improved Nighttime Delineation	Overhead Lighting	Low	Short-Term (1-2yrs)	Y
		Wet/Nighttime Reflective Pavement Markings	Low	Short-Term (1-2yrs)	Y
		Replace Worn or Faded Signs	Low - Moderate	Mid-term (3-5yrs)	Y
		Additional Roadside Delineation	Low	Short-Term (1-2yrs)	Y

Emphasis Area	Strategy	Relative Cost	Relative Time Frame	Systemic
Impaired Driver Involved Crashes	Transit & Ridesharing Programs	Moderate	Mid-term (3-5yrs)	N
	Drug Recognition Expert (DRE) Training	Moderate	Mid-term (3-5yrs)	N
	High Visibility Enforcement Campaigns	Moderate	Short-Term (1-2yrs)	N
	Education & Treatment Awareness Campaigns	Moderate	Mid-term (3-5yrs)	N

Emphasis Area	Strategy	Relative Cost	Relative Time Frame	Systemic
Driver Behavior	Automated Enforcement	Moderate	Long-term (5+yrs)	N
	Mobile & Fixed Speed Feedback Signs	Low - Moderate	Mid-term (3-5yrs)	N

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	Road Diets & Complete Streets	Road Diet	Moderate	Mid-term (3-5yrs)	N
		Rectangular Rapid Flashing Beacon (RRFB)	Low	Short-Term (1-2yrs)	Y
		High-Intensity Actuated Crosswalk (HAWK)	Moderate	Mid-term (3-5yrs)	N
		Install Bike Lane	Low	Mid-term (3-5yrs)	N
		Install Buffered Bike Lane	Moderate	Mid-term (3-5yrs)	N
		Install Sharrow	Low	Short-Term (1-2yrs)	N
	Traffic Calming Projects	Raised Intersection	Moderate	Mid-term (3-5yrs)	N
		Raised Crosswalk	Moderate	Mid-term (3-5yrs)	N
		Speed Tables/Humps	Low	Short-Term (1-2yrs)	N
		Gateway Treatment	Moderate	Short-Term (1-2yrs)	N
		On-Street Parking	Low	Short-Term (1-2yrs)	N
		Widen Existing Sidewalk	Moderate	Mid-term (3-5yrs)	Y
		Sidewalk/Curb Bump-Outs	Low - Moderate	Mid-term (3-5yrs)	N
		Chicanes	Low - Moderate	Mid-term (3-5yrs)	N
		Roundabouts	High	Long-term (5+yrs)	N
		Diverting Island / Raised Medians	Moderate	Mid-term (3-5yrs)	N
		Tight Corner Radii	Moderate	Mid-term (3-5yrs)	Y
	Distracted Driver Education Campaign		Moderate	Short-Term (1-2yrs)	N

Emphasis Area	Strategy	Relative Cost	Relative Time Frame	Systemic
Motorcycle Crashes	Education Campaign	Moderate	Short-Term (1-2yrs)	N
	Enforcement Campaign	Moderate	Short-Term (1-2yrs)	N

	Motorcycle Focused Emergency Response Training	Moderate	Short-Term (1-2yrs)	N

Emphasis Area		Strategy	Relative Cost	Relative Time Frame	Systemic
Vulnerable Road Users	Transit Access	Provide ADA Accessible Transit Stops	Low - Moderate	Mid-term (3-5yrs)	Y
		Provide Shelters from Inclement Weather	Low - Moderate	Mid-term (3-5yrs)	Y
		Improve Transit Stop/Route Wayfinding	Low	Short-Term (1-2yrs)	Y
		Review and Update Transit Stop Locations	Moderate	Mid-term (3-5yrs)	N
	Crosswalk Improvements	Enhanced Pedestrian Crossing Pavement Markings	Low	Short-Term (1-2yrs)	Y
		Advanced and at Crossing Signage	Low	Short-Term (1-2yrs)	Y
		Street & Pedestrian Level Lighting	Moderate	Mid-term (3-5yrs)	N
		Rapid Rectangular Flashing Beacon (RRFB)	Low	Short-Term (1-2yrs)	Y
		High-Intensity Actuated Crosswalk (HAWK)	Moderate	Mid-term (3-5yrs)	N
		Pedestrian Countdown Timers & Pushbutton Actuation (Signalized Only)	Moderate	Short-Term (1-2yrs)	N
		Leading Pedestrian Phase (Signalized Only)	Low	Short-Term (1-2yrs)	N
		Sidewalk/Curb Bump-Outs	Low - Moderate	Mid-term (3-5yrs)	N
		Raised Crosswalk	Moderate	Mid-term (3-5yrs)	N
	Sidewalk & Multi-Use Trail Connectivity	Fill Gaps in Non-Motorized Network	Moderate	Mid-term (3-5yrs)	N
		Sign and Delineate Non-Motorized Trail Crossings	Low	Short-Term (1-2yrs)	Y
		Widening Existing Narrow Sidewalk	Moderate	Mid-term (3-5yrs)	Y
		Reducing or Eliminate Trip Hazards	Low - Moderate	Short-Term (1-2yrs)	Y
		Provide/Upgrade to ADA Compliant Facilities	Moderate	Mid-term (3-5yrs)	Y
	Bike Lanes & Sharrows	Bike Lane	Low	Short-Term (1-2yrs)	N
		Buffered Bike Lane	Moderate	Mid-term (3-5yrs)	N
		Sharrow	Low	Short-Term (1-2yrs)	N
	Reduce Lighting Gaps		Moderate	Mid-term (3-5yrs)	N
	Community Education & Awareness Programs		Moderate	Short-Term (1-2yrs)	N

Emphasis Area		Strategy	Relative Cost	Relative Time Frame	Systemic
Wrong-Way	Signing & Pavement Marking Enhancements	Replace Worn or Faded Signs	Low - Moderate	Mid-term (3-5yrs)	Y
		Reflectorized Sign Supports	Low	Short-Term (1-2yrs)	Y
		Increase Sign Size	Low - Moderate	Short-Term (1-2yrs)	Y
		Supplemental “Do Not Enter” Signs	Low	Short-Term (1-2yrs)	Y

		Lower Wrong Way Sign Mounting Height	Low	Short-Term (1-2yrs)	Y
		Review and Update Sign Placement for Visibility	Low - Moderate	Mid-term (3-5yrs)	N
		LED Sign Borders	Low	Mid-term (3-5yrs)	Y
		In-Lane Lane Use Pavement Marking Arrows/Route Shields	Moderate	Short-Term (1-2yrs)	Y
		Nighttime/Wet Reflective Pavement Markings	Moderate	Short-Term (1-2yrs)	Y
	Geometric Enhancements	Directional Rumble Strips	Low	Mid-term (3-5yrs)	Y
		Raised Median (Adding or Revising Openings)	Moderate	Mid-term (3-5yrs)	N
		Channelizing (Island & Longitudinal)	Low - Moderate	Mid-term (3-5yrs)	N
		Reduce/Eliminate Radii to Discourage Wrong-Way Turns	Moderate	Mid-term (3-5yrs)	N
		Increase Separation Between On- and Off-Ramp Terminals	High	Long-term (5+yrs)	N
		Increase On-Ramp Throat Opening and Reduce Off-Ramp Throat Opening	Moderate - High	Long-term (5+yrs)	N
		Roundabout	High	Long-term (5+yrs)	N
		Diverging Diamon Interchange	High	Long-term (5+yrs)	N
	Lighting & Delineation	Install/Improve Lighting	Moderate	Mid-term (3-5yrs)	N
		Nighttime/Wet Reflective Pavement Markings	Moderate	Short-Term (1-2yrs)	Y
		Install Wrong-Way Barrier Delineators	Low	Short-Term (1-2yrs)	Y
	ITS & Signal Treatments		Moderate - High	Mid-term (3-5yrs)	N
	Wrong-Way Driving Network Screening		Moderate	Short-Term (1-2yrs)	N

A-4 COMPREHENSIVE SAFETY ACTION PLAN SELF-CERTIFICATION WORKSHEET

APPENDIX

Safe Streets and Roads for All
Self-Certification Eligibility Worksheet

All applicants should follow the instructions in the NOFO to correctly apply for a grant. See the SS4A website for more information.

Table 1 of the SS4A NOFO describes eight components of an Action Plan, which correspond to the questions in this worksheet. Applicants should use this worksheet to determine whether their existing plan(s) contains the required components to be considered an eligible Action Plan for SS4A.

This worksheet is required for all SS4A **Implementation Grant** applications and any **Planning and Demonstration Grant applications to conduct Supplemental Planning/Demonstration Activities only**. Please complete the form in its entirety, do not adjust the formatting or headings of the worksheet, and upload the completed PDF with your application.

Eligibility

An Action Plan is considered eligible for an SS4A application for an Implementation Grant or a Planning and Demonstration Grant to conduct Supplemental Planning/Demonstration Activities if the following two conditions are met:

- You can answer "YES" to Questions **3, 7,** and **9** in this worksheet; *and*
- You can answer "YES" to **at least four of the six remaining** Questions, **1, 2, 4, 5, 6**, and **8.**

If both conditions are not met, an applicant is still eligible to apply for a Planning and Demonstration Grant to fund the creation of a new Action Plan or updates to an existing Action Plan to meet SS4A requirements.

Applicant Information

Lead Applicant: _____ **UEI:** _____

Action Plan Documents

In the table below, list the relevant Action Plan and any additional plans or documents that you reference in this form. Please provide a hyperlink to any documents available online or indicate that the Action Plan or other documents will be uploaded in Valid Eval as part of your application. Note that, to be considered an eligible Action Plan for SS4A, the plan(s) coverage must be broader than just a corridor, neighborhood, or specific location.

Document Title	Link	Date of Most Recent Update
WestPlan MPO Safety Action Plan		04/17/2024

Action Plan Components

For each question below, answer "YES" or "NO." If "YES," list the relevant plan(s) or supporting documentation that address the condition and the specific page number(s) in each document that corroborates your response. This form provides space to reference multiple plans, but please list only the most relevant document(s).

1. Leadership Commitment and Goal Setting

Are **BOTH** of the following true?

- A high-ranking official and/or governing body in the jurisdiction publicly committed to an eventual goal of zero roadway fatalities and serious injuries; and
- The commitment includes either setting a target date to reach zero OR setting one or more targets to achieve significant declines in roadway fatalities and serious injuries by a specific date.

☑ **YES**
☐ **NO**

Note: This may include a resolution, policy, ordinance, executive order, or other official announcement from a high-ranking official and the official adoption of a plan that includes the commitment by a legislative body.

If "YES," please list the relevant document(s) and page number(s) that corroborate your response.

Document Title	Page Number(s)
WestPlan MPO Safety Action Plan	3,105

2. Planning Structure

To develop the Action Plan, was a committee, task force, implementation group, or similar body established and charged with the plan's development, implementation, and monitoring?

☑ **YES**
☐ **NO**

Note: This should include a description of the membership of the group and what role they play in the development, implementation, and monitoring of the Action Plan.

If "YES," please list the relevant document(s) and page number(s) that corroborate your response.

Document Title	Page Number(s)
WestPlan MPO Safety Action Plan	14

3. Safety Analysis

Does the Action Plan include **ALL** of the following?

- Analysis of existing conditions and historical trends to provide a baseline level of crashes involving fatalities and serious injuries across a jurisdiction, locality, Tribe, or region;
- Analysis of the location where there are crashes, the severity, as well as contributing factors and crash types;
- Analysis of systemic and specific safety needs, as needed (e.g., high-risk road features or specific safety needs of relevant road users); and,
- A geospatial identification (geographic or locational data using maps) of higher risk locations.

☑ YES
☐ NO

Note: Availability and level of detail of safety data may vary greatly by location. The Fatality and Injury Reporting System Tool (FIRST) provides county- and city-level data. When available, local data should be used to supplement nationally available data sets.

If "YES," please list the relevant document(s) and page number(s) that corroborate your response.

Document Title	Page Number(s)
WestPlan MPO Safety Action Plan	4-14,25,30,34,39,43

4. Engagement and Collaboration

Did the Action Plan development include **ALL** of the following activities?

- Engagement with the public and relevant stakeholders, including the private sector and community groups;
- Incorporation of information received from the engagement and collaboration into the plan; and
- Coordination that included inter- and intra-governmental cooperation and collaboration, as appropriate.

☑ YES
☐ NO

Note: This should be a description of public meetings, participation in public and private events, and proactive meetings with stakeholders.

If "YES," please list the relevant document(s) and page number(s) that corroborate your response.

Document Title	Page Number(s)
WestPlan MPO Safety Action Plan	15,89-91,107-109

5. Equity Considerations

Did the Action Plan development include **ALL** of the following?

- Considerations of equity using inclusive and representative processes;
- The identification of underserved communities through data; and
- Equity analysis developed in collaboration with appropriate partners, including population characteristics and initial equity impact assessments of proposed projects and strategies.

☑ **YES**
☐ **NO**

Note: This should include data that identifies underserved communities and/or reflects the impact of crashes on underserved communities, prioritization criteria that consider equity, or a description of meaningful engagement and collaboration with appropriate stakeholders.

If "YES," please list the relevant document(s) and page number(s) that corroborate your response.

Document Title	Page Number(s)
WestPlan MPO Safety Action Plan	7,14,15,102

6. Policy and Process Changes

Are **BOTH** of the following true?

- The plan development included an assessment of current policies, plans, guidelines, and/or standards to identify opportunities to improve how processes prioritize safety; and
- The plan discusses implementation through the adoption of revised or new policies, guidelines, and/or standards.

☐ **YES**
☑ **NO**

Note: This may include existing and/or recommended Complete Streets policy, guidelines for community engagement and collaboration, policy for prioritizing areas of greatest need, local laws (e.g., speed limit), design guidelines, and other policies and processes that prioritize safety.

If "YES," please list the relevant document(s) and page number(s) that corroborate your response.

Document Title	Page Number(s)

APPENDIX

7. Strategy and Project Selections

Does the plan identify a comprehensive set of projects and strategies to address the safety problems in the Action Plan, with information about time ranges when projects and strategies will be deployed, and an explanation of project prioritization criteria?

☑ YES
☐ NO

Note: This should include one or more lists of community-wide multi-modal and multi-disciplinary projects that respond to safety problems and reflect community input and a description of how your community will prioritize projects in the future.

If "YES," please list the relevant document(s) and page number(s) that corroborate your response.

Document Title	Page Number(s)
WestPlan MPO Safety Action Plan	15-54, 92-97,101, 102

8. Progress and Transparency

Does the plan include **BOTH** of the following?

- A description of how progress will be measured over time that includes, at a minimum, outcome data.
- The plan is posted publicly online.

☐ YES
☑ NO

Note: This should include a progress reporting structure and list of proposed metrics.

If "YES," please list the relevant document(s) and page number(s) that corroborate your response.

Document Title	Page Number(s)

9. Action Plan Date

Was at least one of your plans finalized and/or last updated between 2019 and April 30, 2024?

☑ YES
☐ NO

Note: Updates may include major revisions, updates to the data used for analysis, status updates, or the addition of supplemental planning documents, including but not limited to an Equity Plan, one or more Road Safety Audits conducted in high-crash locations, or a Vulnerable Road User Plan.

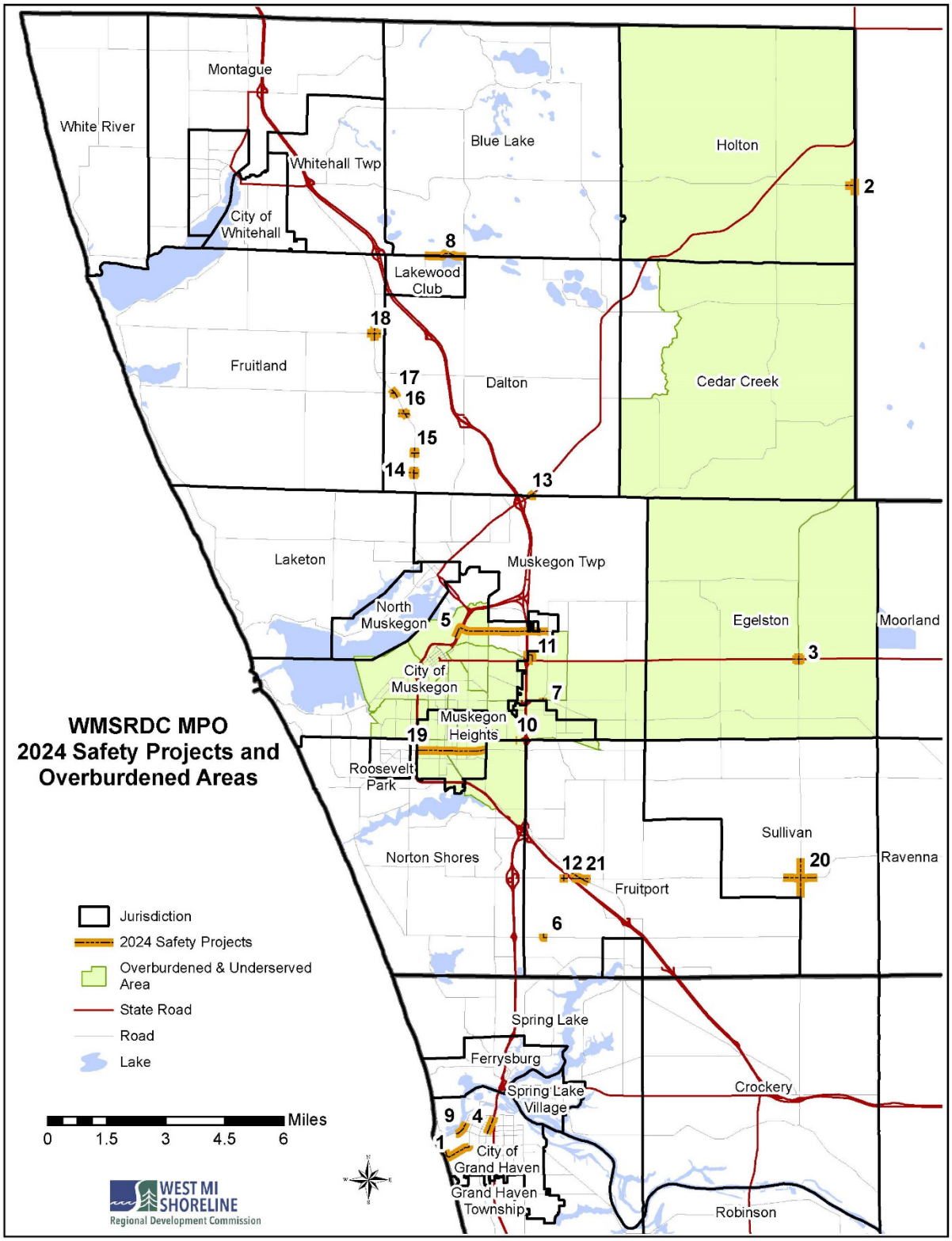
If "YES," please list your most recent document(s), date of finalization, and page number(s) that corroborate your response.

Document Title	Date of Most Recent Update	Page Number(s)
WestPlan MPO Safety Action Plan	04/17/2024	Page vi

A-5 COMPREHENSIVE SAFETY ACTION PLAN PROJECT RANKING CRITERIA AND PROJECTS

APPENDIX

Criteria	Requirements	Max Points
Plan Consistency	**Project is consistent with priorities discussed in the Safety Plan.** • *Intersection Sight Distance & Traffic Control* • *Lane Departure* • *Impaired Driver Involved Crashes* • *Driver Behaviour Related* • *Motorcycle Involved Crashes* • *Vulnerable Road User Involved Crashes* • *Wrong-Way Driving* *The selected Emphasis Areas and guidance from stakeholders were used to categorize practical treatment strategies for addressing the identified target crashes in both systemic and systematic approaches.*	25
Project Location in an Underserved Community	**Project is located in a historically underserved community.** *An underserved community as defined for this NOFO is consistent with the Office of Management and Budget (OMB) and DOT definitions of a disadvantaged community designation, which includes any Tribal land; any territory or possession of the United States; or U.S. Census tracts identified in one of the following tools (may only select one option to identify underserved communities:* • *The USDOT Equitable Transportation Community Explorer (ETCE) https://experience.arcgis.com/experience/0920984aa80a4362b8778d779b090723/page/Applicant-Explorer/* • *Any subsequent iterations of the ETCE released during the NOFO period; or* • *The Climate and Economic Justice Screening Tool (CEJST) to identify disadvantaged communities https://screeningtool.geoplatform.gov/.* *Funds to underserved communities are spent in, and provide benefits to, underserved communities.*	20
Effective Practices and Strategies	**Project is consistent with practices and strategies discussed in the Safety Plan.** Example:Traffic Calming Projects *Raised Intersection* *Raised Crosswalk* *Speed Tables/Humps* *Gateway Treatment* *On-Street Parking* *Widen Existing Sidewalk* *Sidewalk/Curb Bump-Outs* *Chicanes* *Roundabouts* *Diverting Island / Raised Medians* *Tight Corner Radii* ***See Appendix A-3 Strategy Summary table for more information.***	15
Crash/Injury History	**Project area has a history of crashes/injuries**	15
Complete Streets/Pedestrian /Non-Motorized Component	**Project inludes a complete streets/non-motorized /pedestrian component.** *Standards or policies that ensure the safe and adequate accommodation of all users of the transportation system, including pedestrians, bicyclists, personal conveyance and micromobility users, public transportation users, children, older individuals, individuals with disabilities, motorists, and freight vehicles.*	15
Public Involvement	**Project was listed in the plan and was available on the MPO's public involvement website for public comment.**	10


WMSRDC MPO
2024 Safety Projects and
Overburdened Areas
Montague
White River
Whitehall Twp
City of Whitehall
Blue Lake
Holton
Lakewood Club
Fruitland
Dalton
Cedar Creek
Laketon
Muskegon Twp
North Muskegon
Egelston
Moorland
City of Muskegon
Muskegon Heights
Roosevelt Park
Norton Shores
Sullivan
Ravenna
Fruitport
Spring Lake
Ferrysburg
Spring Lake Village
Crockery
City of Grand Haven
Grand Haven Township
Robinson
1
2
3
4
5
6
7
8
9
10
11
12 21
13
14
15
16
17
18
19
20
Jurisdiction
2024 Safety Projects
Overburdened & Underserved Area
State Road
Road
Lake
Miles
0
1.5
3
4.5
6
WEST MI SHORELINE
Regional Development Commission

MAP #	Project	Road Agency	Project Description	Plan Consistency	Effective Practices and Strategies	Crash Injury History	Underserved Communities	Pedestrian / Non-Motorized Component	Public Involvement	Total Points
1	Lake Avenue, between Prospect and Woodlawn	City of Grand Haven	Reconstruct approximately 4,300' of Lake Avenue and utilize traffic calming strategies to reduce the speed of traffic through this area to improve pedestrian safety and reduce overall traffic speeds	**25**	**15**	**15**	**0**	**10**	**10**	**75**
2	Maple Island Road at Marvin Road	Muskegon County Road Commission	Installation of advance conflict warning system beacon system.	**25**	**15**	**15**	**20**	**0**	**10**	**85**
3	Maple Island Road at Apple Avenue	Muskegon County Road Commission	Extend Left turn lane to south to reduce conflicts	**25**	**15**	**15**	**20**	**0**	**10**	**85**
4	7th Street, between Clinton Avenue and Beacon Boulevard	City of Grand Haven	Relocate and reconfigure to angled parking on the west side of the roadway, addition of traffic calming elements to reduce speeds and make the corridor more usable for pedestrians and non-motorized vehicles.	**25**	**15**	**15**	**0**	**10**	**10**	**75**
5	Ottawa/Marquette Bike lanes Ottawa & Giddings to Marquette and Quarterline	City of Muskegon	Reduce the road to two lanes and add bike space.	**25**	**15**	**15**	**20**	**10**	**10**	**95**
6	Pontaluna Road at Quarterline Road.	Muskegon County Road Commission	Construct right turn lane for westbound Pontaluna Road.	**25**	**15**	**15**	**0**	**0**	**10**	**65**
7	Quarterline Road – Laketon north to Evanston	Muskegon County Road Commission	Close intersection at Laketon-Evanston. Construct left turn and right turn lanes on Quarterline Road north of Laketon to reduce conflicts.	**25**	**15**	**15**	**20**	**0**	**10**	**85**
8	White Lake Drive, between Russell Road and Automobile Road	Muskegon County Road Commission	Horizontal curve improvements	**25**	**15**	**15**	**0**	**0**	**10**	**65**
9	Harbor Drive, between Franklin Street and Y Drive	City of Grand Haven	Reconstruction of Harbor Drive to better balance spaces for pedestrians, bicycles, and caars	**25**	**15**	**15**	**0**	**10**	**10**	**75**
10	Sherman Blvd at Mercy Drive	Muskegon County Road Commission	Close intersection or install traffic signal	**25**	**15**	**15**	**20**	**0**	**10**	**85**
11	Shonat Street, between Apple Avenue and Oak St.	Muskegon County Road Commission	Construct rapid flashing beacon signal pedestrian crossing	**25**	**15**	**15**	**20**	**10**	**10**	**95**
12	Sternberg Road at Sheridan Road:	Muskegon County Road Commission	Construct center left turn lane on Sternberg Road	**25**	**15**	**15**	**0**	**0**	**10**	**65**
13	River Road-Orchard-M120.	Muskegon County Road Commission	Reconfigure intersections, eliminate eastbound left turn at M120.	**25**	**15**	**15**	**0**	**0**	**10**	**65**
14,15,16,17,18	Whitehall Road:Agard Road, McMillan Road, Bard Road, Duck Lake Road, Michilinda Road.	Muskegon County Road Commission	Construction of center left turn lanes at intersections	**25**	**15**	**15**	**0**	**0**	**10**	**65**
19	Broadway Ave., Glade to Getty	City of Muskegon	Various traffic and pedestrian safety imnprovements	**25**	**15**	**15**	**20**	**10**	**10**	**95**
20	Maple Island Road at Sternberg Road	Muskegon County Road Commission	Focus on failure to yield and failure to stop crash locations.	**25**	**15**	**15**	**0**	**0**	**10**	**65**
21	Airline Road at Sternberg Road	Muskegon County Road Commission	Construct roundabout at intersection to reduce conflicts at skewed intersection.	**25**	**15**	**15**	**0**	**0**	**10**	**65**
NA	Horizontal Curve delineation project, county-wide:	Muskegon County Road Commission	Improved curve warning signage for driver awareness	**25**	**15**	**15**	**0**	**0**	**10**	**65**
NA	Rural intersection stop-control warning improvements, county-wide:	Muskegon County Road Commission	Focus on failure to yield and failure to stop crash locations.	**25**	**15**	**15**	**0**	**0**	**10**	**65**
NA	A city-wide sign inventory	City of Muskegon	Sign inventory, including reflectivity testing and GIS locating.	**25**	**15**	**15**	**20**	**0**	**10**	**85**
NA	Signal replacement project, various City locations.	City of Muskegon	Signal replacement, various City locations.	**25**	**15**	**15**	**20**	**0**	**10**	**85**