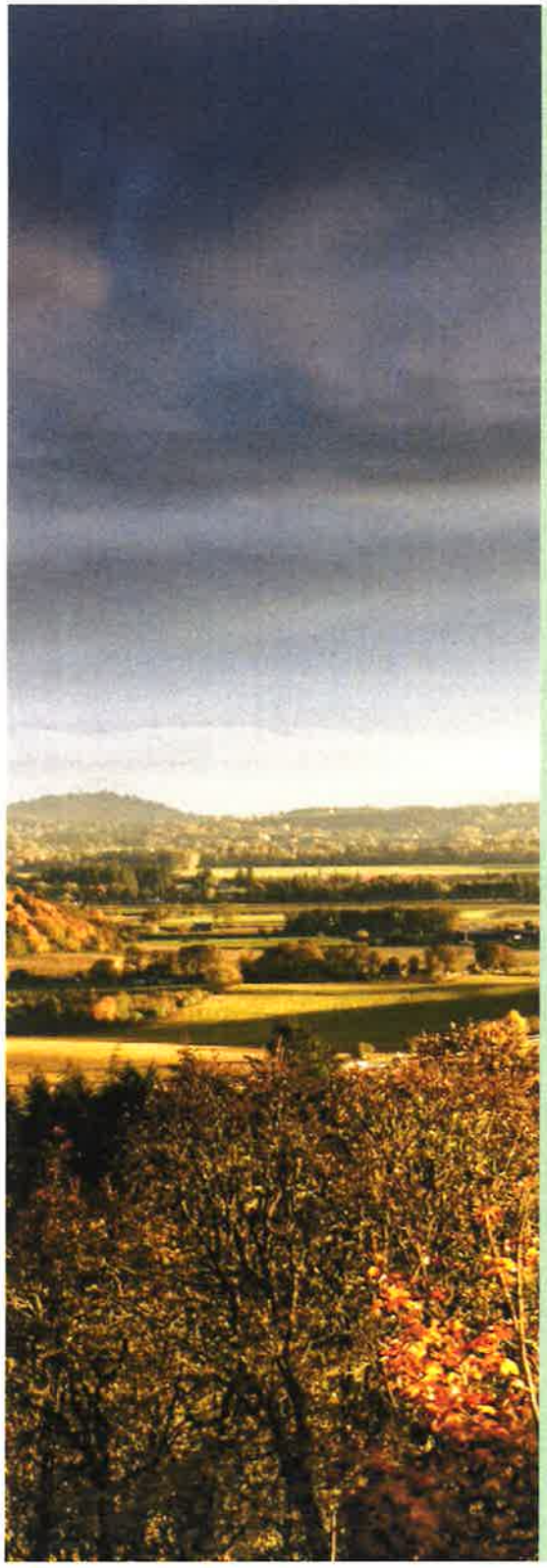
Marion County

Transportation Safety Action Plan

June 2025



Acknowledgments

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Adoption

This plan has been approved and adopted by the Marion County Board of Commissioners at the recommendation of the Marion County Public Works Director this ***18th day*** *of* ***June, 2025.***

MARION COUNTY BOARD OF COMMISSIONERS:

Danielle Bethell, Chair

Kevin Cameron, Commissioner

Not Present At Meeting

Colm Willis, Commissioner

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1 *Introduction*

Marion County, Oregon is in the heart of the Willamette Valley, stretching from the Willamette River to the Cascade Mountain range. Marion County is home to the state capitol (Salem), has the highest agriculture production in the state with over 10,000 acres of planted orchards, and is also home to several tourist attractions and recreational areas like Silver Falls State Park, the Oregon Garden, and Detroit Lake.

Introduction

Marion County, Oregon is in the heart of the Willamette Valley, stretching from the Willamette River to the Cascade Mountain range, as shown in **FIGURE 1**. As of 2020, approximately 346,000 people call Marion County home, making it the fifth most populated county in Oregon.[1]

The County's transportation network includes 1,121 miles of roadways that serve local residents, commuters, and visitors. Between 2017 and 2021, **61 people died** and **147 people were seriously injured** in crashes involving motor vehicles on these County-owned roadways. On average, there are 413 crashes per year, more than one per day, on the County's transportation system. Like many agencies across the United States, Marion County is actively working to reduce these numbers and make the transportation system safer for everyone.

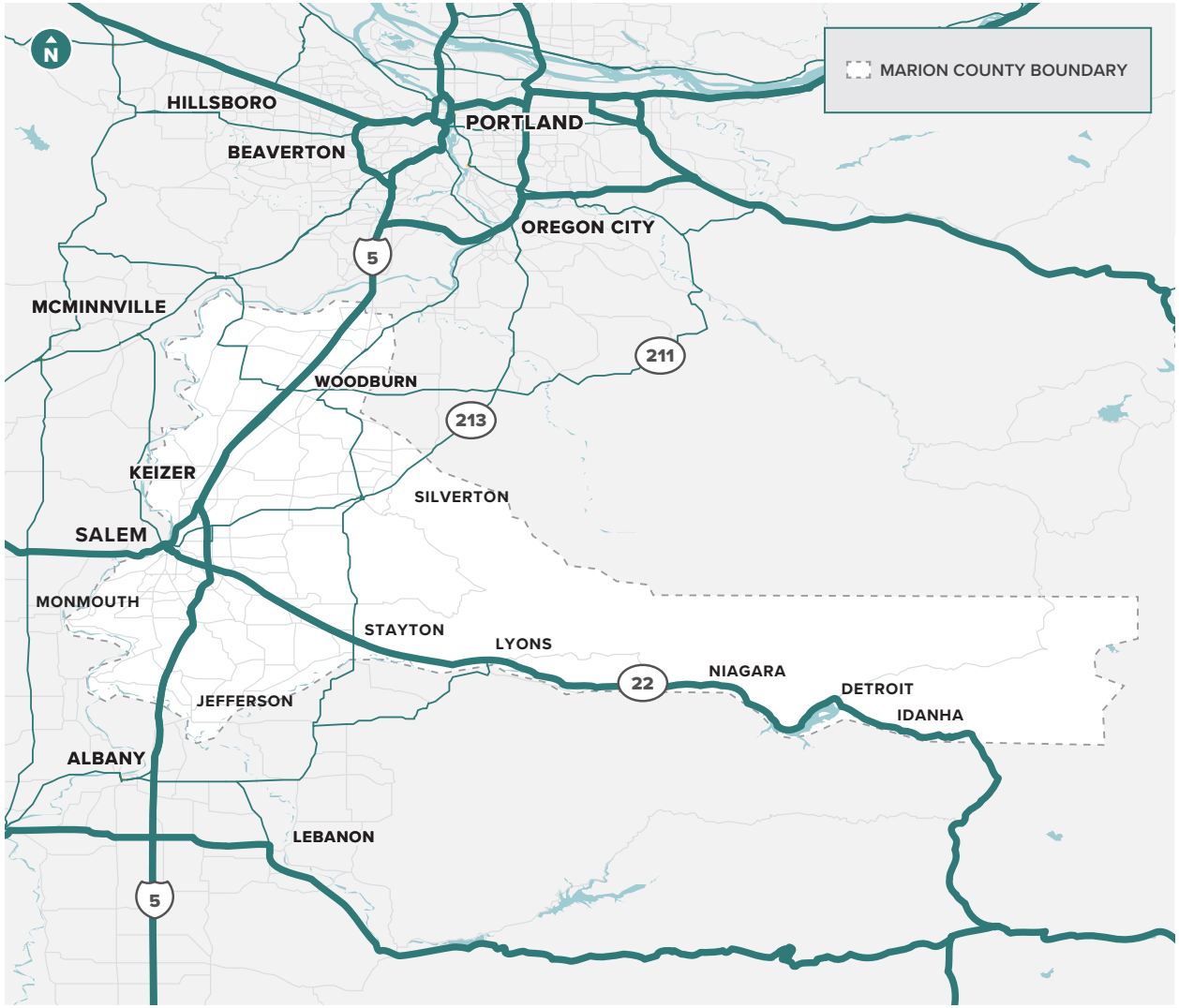


FIGURE 1. MARION COUNTY STUDY AREA

1 Full access to Marion County U.S. Census Bureau information: https://www.census.gov/quickfacts/marioncountyoregon

What Is a TSAP?

Marion County is committed to improving safety and eliminating the risk of fatal and serious injury crashes on its transportation system. This Transportation Safety Action Plan (TSAP) is a data-driven plan that was developed in collaboration with a Task Force and local partners with a vested interest in safety. With a focus on the Safe System Approach (see page 5), this TSAP will help guide the County's investments, encourage future collaboration with safety partners, and aid the County in securing state and federal grant funding for safety improvement projects.

By implementing the policies, projects, and strategies in this TSAP, Marion County will incrementally improve the safety of everyone who travels in the County, whether they drive, ride, walk or use transit.

Our Vision

Marion County envisions a future where no one is killed or seriously injured while traveling on our roadways. We aim to reduce the number of fatal and serious injury crashes on County roadways by 20 percent by 2030, and by 50 percent by 2035.

Recent Progress in Transportation Safety

The County has partnered with several agencies on various projects to make strides in advancing its vision of transportation safety. Most recently, the County has participated in the following projects:

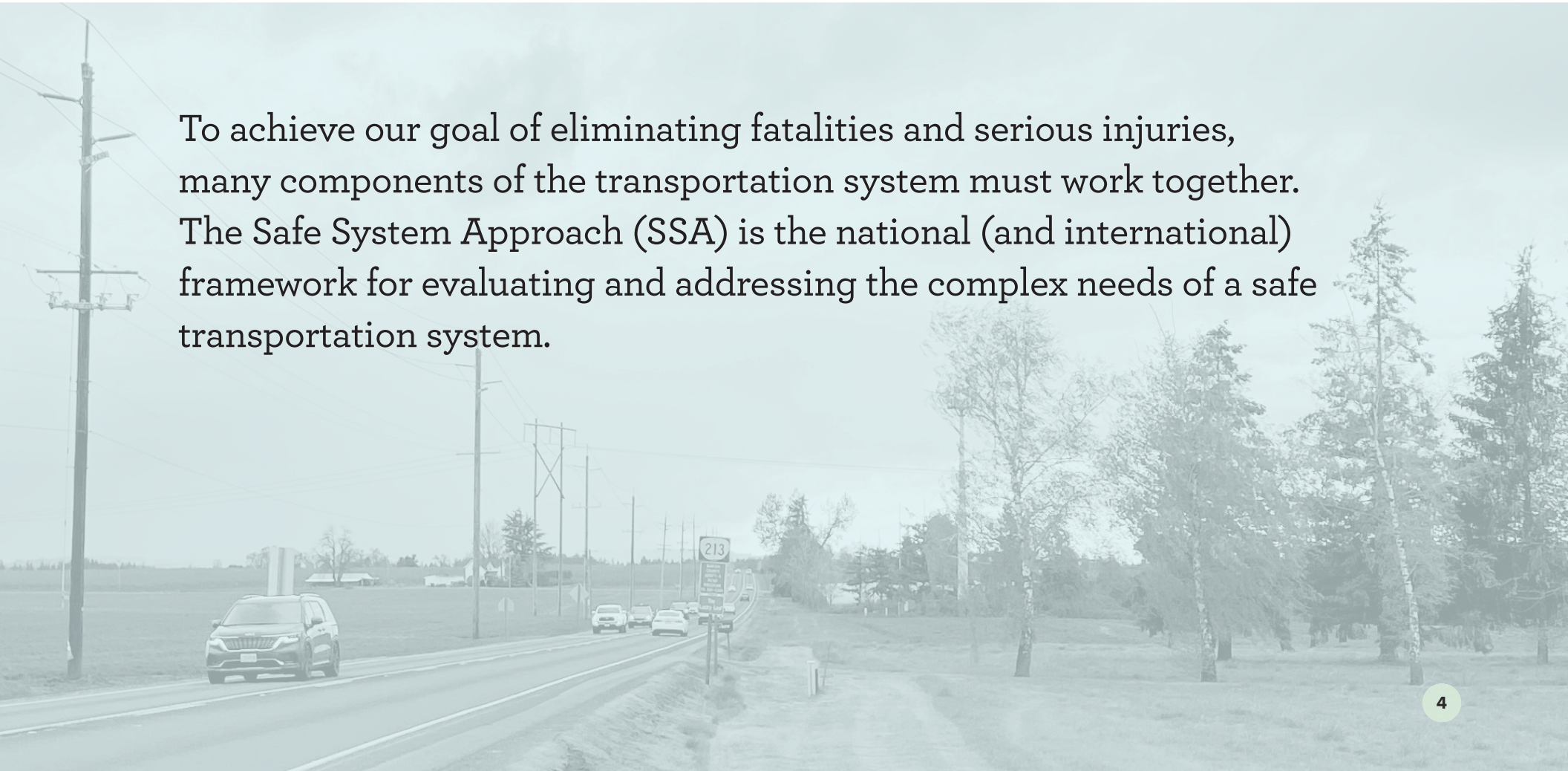
- The Metropolitan Transportation Safety Action Plan (MTSAP) for the Salem-Keizer Area Transportation Study (SKATS) metropolitan planning area, which encompasses all roadways within the cities of Salem, Keizer, Turner, and Aumsville, as well as roadways within adjacent the urban areas of Polk and Marion counties.[1] Since the MTSAP is evaluating safety needs on regional roads within SKATS, this Plan is focused on County roadways outside the SKATS area.
- The Cordon-Kuebler Corridor Plan in collaboration with the City of Salem, determined multimodal projects needed in the next 20 years to address community concerns related to safety, traffic congestion, and multimodal facilities as well as accommodate future regional growth.[2] The Cordon-Kuebler corridor was also included in the SKATS MTSAP analyses; therefore, this Plan excludes the Cordon-Kuebler corridor from the crash data analysis, but considers it in the evaluation of roadways with the highest concentration of crashes with most severe outcomes.

1 SKATS Metropolitan Transportation Safety Action Plan, adopted Sept. 2024. https://www.mwvcog.org/media/5941

2 Cordon Kuebler Corridor Plan Summary Report, adopted Feb. 2024. Final document and appendix available at https://www.co.marion.or.us/PW/Engineering/Pages/default.aspx under Transportation Plans.

2 *Embracing a Safe System Approach*

To achieve our goal of eliminating fatalities and serious injuries, many components of the transportation system must work together. The Safe System Approach (SSA) is the national (and international) framework for evaluating and addressing the complex needs of a safe transportation system.



The Safe System Approach

To achieve our goal of eliminating fatalities and serious injuries, many components of the transportation system must work together. The Safe System Approach (SSA) is the national (and international) framework for evaluating and addressing the complex needs of a safe transportation system.[1] The SSA applies a holistic and comprehensive approach to eliminate fatalities and serious injuries, with an emphasis on five main elements: safer roads, safer road users, safer speeds, safer vehicles, and post-crash care (**FIGURE 2**).

Under the SSA, all participants of the transportation system including road users, vehicle manufacturers, and professionals such as planners, designers, builders, operators, law enforcement and emergency responders share the responsibility for road safety.

The SSA recognizes that safety is increased when we examine how all parts of the system interact to support and strengthen the system. This helps to create a redundant safety net, so that if one part of the system fails, another may prevent injury or death. The elements of the SSA are described in **FIGURE 3** on the following page.

These elements are supported by the following core principles, as shown around the perimeter of **FIGURE 2**.

FIGURE 2. THE SAFE SYSTEM APPROACH

1 U.S Department of Transportation. What is a Safe System Approach? (Oct. 2022) https://www.transportation.gov/NRSS/SafeSystem

Safe System Principles

Death / Serious Injury Is Unacceptable

Nobody should die or suffer a life-changing injury while traveling to their destinations. Road safety investments prioritize strategies that prevent deaths and serious injuries.

Humans Make Mistakes

Roadway design and operations are forgiving of human errors and reduce the potential for road user behaviors that can lead to death or serious injury.

Humans Are Vulnerable

The human body has limits for tolerating crash forces before death or serious injury occurs. People walking, riding bicycles or motorcycles are more exposed and are therefore considered Vulnerable Road Users (VRUs). A safe transportation system is designed to accommodate and protect physical human vulnerabilities, regardless of mode of travel.

Responsibility Is Shared

All users of the transportation system share a responsibility to keep ourselves and others safe.

Safety Is Proactive

Risks for future crashes to occur are mitigated in addition to addressing needs where crashes have happened in the past.

Redundancy Is Crucial

If one element of the safe transportation system fails, other elements are in place to prevent deaths and serious injuries.

Safe System Elements

Safer People

Encourage safe and responsible driving and behavior

Create conditions that allow them to reach their destination unharmed

Safer Vehicles

Expand vehicle systems to prevent crashes

Minimize the impact of crashes on those in and out of the vehicle

Safer Speeds

Promote safer speeds in all roadway environments

Safer Roads

Design roadways to mitigate human mistakes, account for injury tolerances, encourage safe driving behaviors, facilitate safe travel for VRUs

Post-Crash Care

Enhance the survivability of a crash

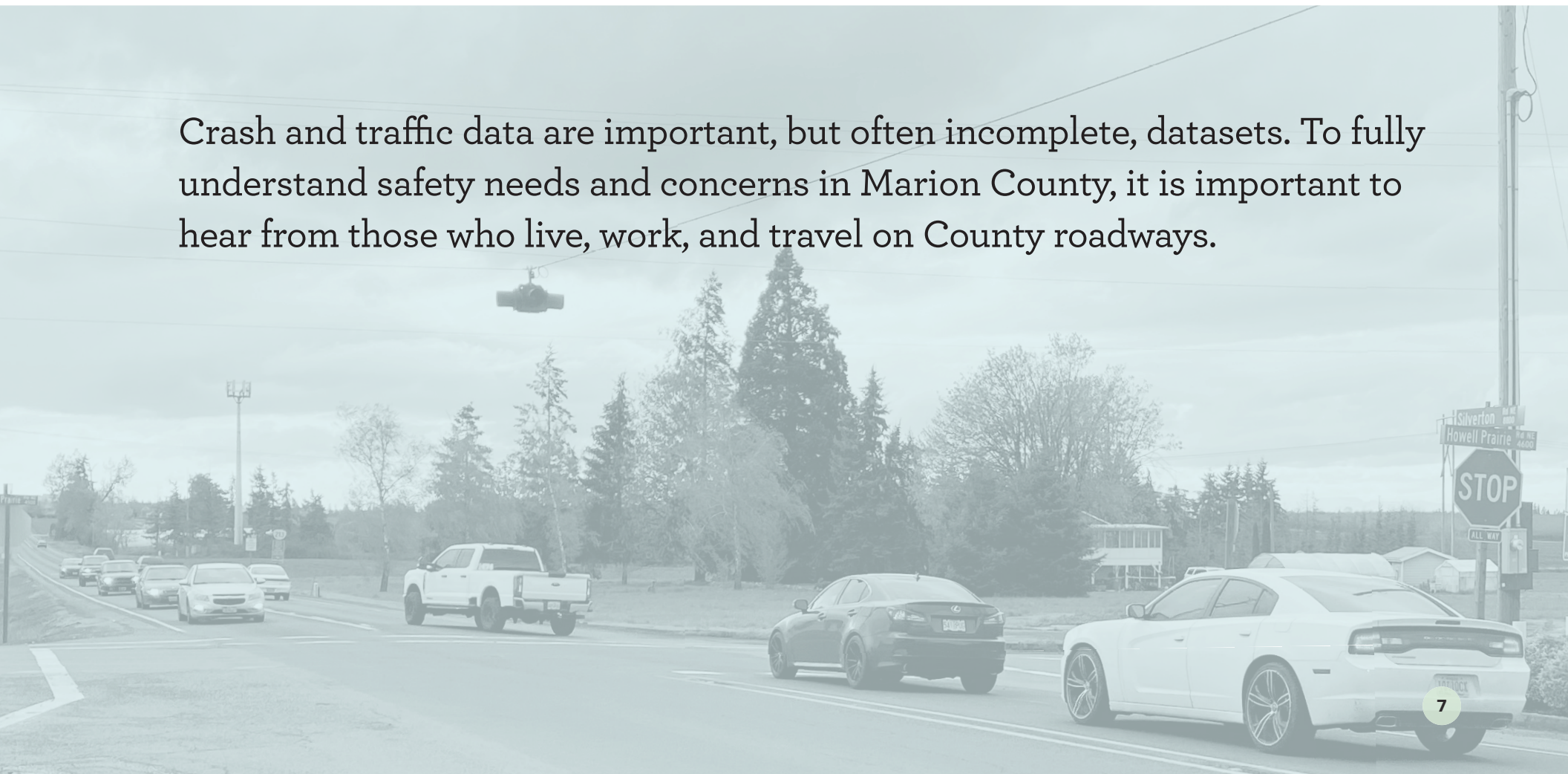
Create a safe working environment for first responders

Prevent secondary crashes

FIGURE 3. THE SAFE SYSTEM APPROACH PRINCIPLES AND ELEMENTS

3 *Community Engagement*

Crash and traffic data are important, but often incomplete, datasets. To fully understand safety needs and concerns in Marion County, it is important to hear from those who live, work, and travel on County roadways.



Community Engagement

During the project, the community provided input and shared their experiences through social media, interactive meetings, and collaboration with Task Force members. To engage as many community members as possible, flyers for events were made available in English, Spanish, and Russian.

Additionally, the County hosted six in-person Open House events in distinct locations across the County (cities of Aurora, Silverton, Aumsville, Gervais, Jefferson, and Stayton) to ensure inclusion of various communities. During these in-person events, 37 people shared their stories and concerns. The primary areas of concern were unsafe speeds and infrastructure needs (wider shoulders, more bike lanes, and improved pavement conditions). A detailed summary of all engagement activities is provided in **Appendix D**.

The Task Force committee was established to guide and implement the TSAP. It is composed of championing members of the community (first responders, law enforcement, school officials, elected officials, community based organizations, etc.) that bring diverse perspectives on transportation safety and will be key partners as the County works to implement the strategies in this plan.

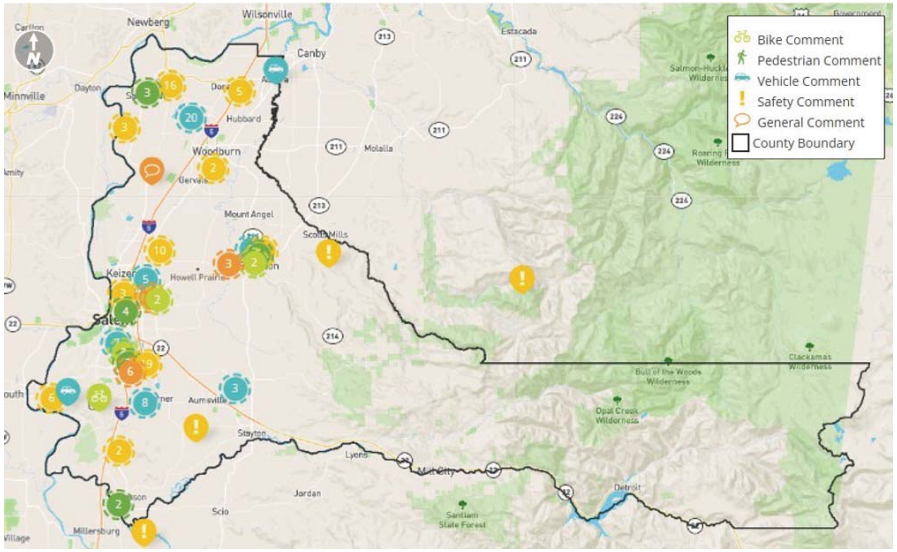
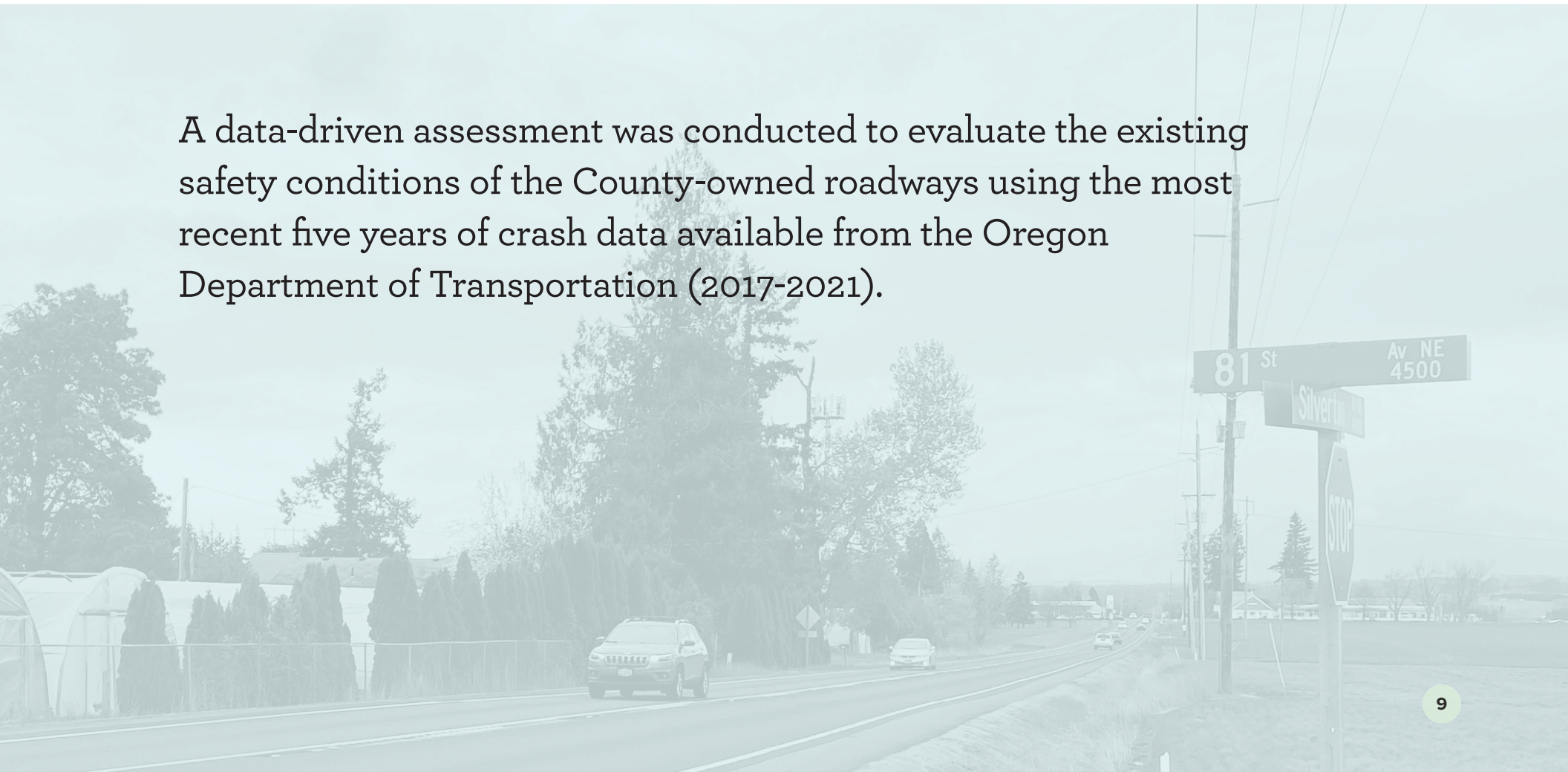


FIGURE 4. ONLINE COMMENT MAP

A project website was launched at the beginning to the study to share project information, objectives, and provide virtual opportunities for community engagement. An interactive online comment map was also a part of the project website where community members could share their experiences and concerns at specific locations (**FIGURE 4**). Out of the 144 comments received, the most commonly noted concerns were risky behaviors (speeding, distraction, and aggressive driving), and infrastructure needs (improved pavement condition, more sidewalks, more bike lanes, wider shoulders, etc.). General feedback gathered from the public influenced the selection of emphasis areas, and location-specific concerns were incorporated into the diagnosis of crash risks as well as the prioritization of safety projects.

4 *Crash Data Summary*

A data-driven assessment was conducted to evaluate the existing safety conditions of the County-owned roadways using the most recent five years of crash data available from the Oregon Department of Transportation (2017-2021).



Crash Data Summary

The study area covers all Marion County owned roadways outside of the Salem-Keizer Urban Growth Boundary (UGB) and excludes state highways. The following sections summarize the key findings relating to County crash trends and identification of high crash locations. The full evaluation of existing safety conditions is included in the appendix.

Crash Data

Crash records summarize the crash details provided by the reporting officer or driver (for self-reported crashes). These details include information about the crash location (jurisdiction, route, postmile, etc.), demographics of those involved (age, gender, etc.), environmental factors (lighting, weather, road surface condition, date, time of day, etc.), and crash event details (contributing factors, type of collision, vehicle movements, injury severity of those involved, etc.).

For purposes of this evaluation, crash severity is categorized in accordance with the Oregon Department of Transportation (ODOT) crash severity definitions:

- **FATAL:** A collision that results in the death of a person within 30 days of the collision.
- **SERIOUS INJURY:** A collision that results in broken bones, dislocation, severe lacerations, or unconsciousness, but not death.
- **MINOR INJURY:** A collision that results in other visible injuries, including minor lacerations, bruising, and rashes.
- **POSSIBLE INJURY:** A collision that results in the complaint of non-visible pain/injury, such as confusion, limping, and soreness.
- **PROPERTY DAMAGE ONLY (PDO):** A collision without injury or complaint of pain but resulting in property damage to a vehicle or another object, commonly referred to as a “fender bender.”

County-wide Crash Summary

Between 2017 and 2021, 2,066 crashes were reported on Marion County-owned roadways. Of those crashes, 771 occurred at intersections (37 percent of total), but more specifically, 594 crashes (29 percent of total) took place at stop-controlled intersections.

An average of 413 crashes occurred per year as shown in **FIGURE 4**. While the number of fatal and serious injury crashes remained consistent, the number of minor injuries increased, and the number of possible injuries and PDO crashes dropped slightly.

Among the leading crash types recorded in Marion County were fixed object crashes, rear-end crashes, and turning movement crashes, summarized below in **TABLE 1**. This table provides a breakdown of the leading crash types and causes in addition to those specifically related to high severity injuries (serious injury or fatality, 179 in total). Crash characteristics with notably higher proportions under the 'high severity only' column indicate those crash types are more likely to result in fatal or serious injuries in Marion County. Similar information is also presented graphically in **FIGURE 5**.

> *Supplemental crash analysis, including critical crash rate analysis at key intersections, can be found in Appendix C.*

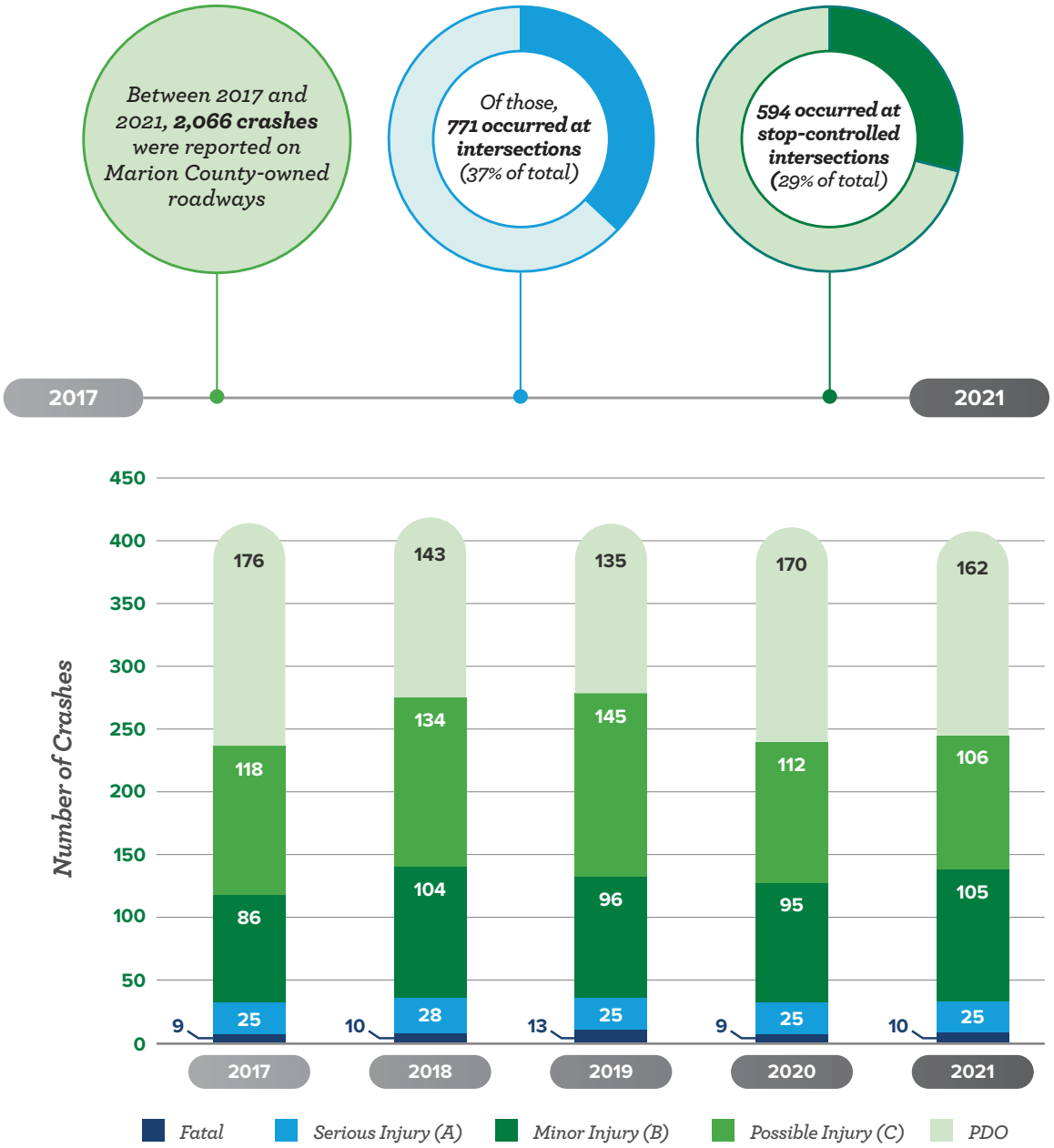


FIGURE 5. CRASH SEVERITY PER YEAR (2017-2021)

TABLE 1. SUMMARY OF LEADING CRASH CHARACTERISTICS IN MARION COUNTY, 2017-2021

CHARACTERISTIC	ALL SEVERITIES		HIGH SEVERITY ONLY	
	COUNT	PERCENTAGE	COUNT	PERCENTAGE
TOP CRASH TYPES				
FIXED OBJECT	743	36.0%	79	**44.1%**
REAR END	419	20.3%	16	8.9%
TURNING	404	19.6%	16	8.9%
ANGLE	183	8.9%	18	**10.1%**
SIDESWIPE-MEETING	78	3.8%	6	3.4%
HEAD-ON	73	3.5%	26	**14.5%**
NON-COLLISION	39	3.1%	11	**6.2%**
TOP CRASH CAUSES				
DID NOT YIELD RIGHT-OF-WAY	418	20.2%	22	12.3%
FAILED TO AVOID VEHICLE AHEAD	265	12.8%	7	3.9%
TOO FAST FOR CONDITIONS	254	12.3%	40	**22.4%**
OTHER IMPROPER DRIVING	210	10.2%	22	**12.3%**
INATTENTION	167	8.1%	21	**11.7%**
CARELESS	104	5.0%	13	**7.3%**
SPEEDING (BEYOND SPEED LIMIT)	55	2.7%	10	**5.6%**

Percentages higher for High Severity than All Severity in **BOLD**.

The data shown in **TABLE 2** indicate the following about fatal and serious injury crashes on Marion County roadways:

- 60 percent of fatal and serious injury crashes involved a driver leaving the roadway.
- Vulnerable road users are overrepresented in fatal and serious injury crashes. Pedestrians, bicyclists, and motorcyclists were involved in 4.5 percent of all crashes, but 17 percent of fatal and serious injury crashes. When a collision occurs with a vulnerable road user, the risk of injury is high.
- Risky behaviors are overrepresented in fatal and serious injury crashes, where 36% involved speeding, 25% involved alcohol impairment, 18% involved drug impairment, and 12% involved distraction.
- Younger drivers (under age 21) were involved in nearly one-third (27%) of fatal and serious injury crashes.

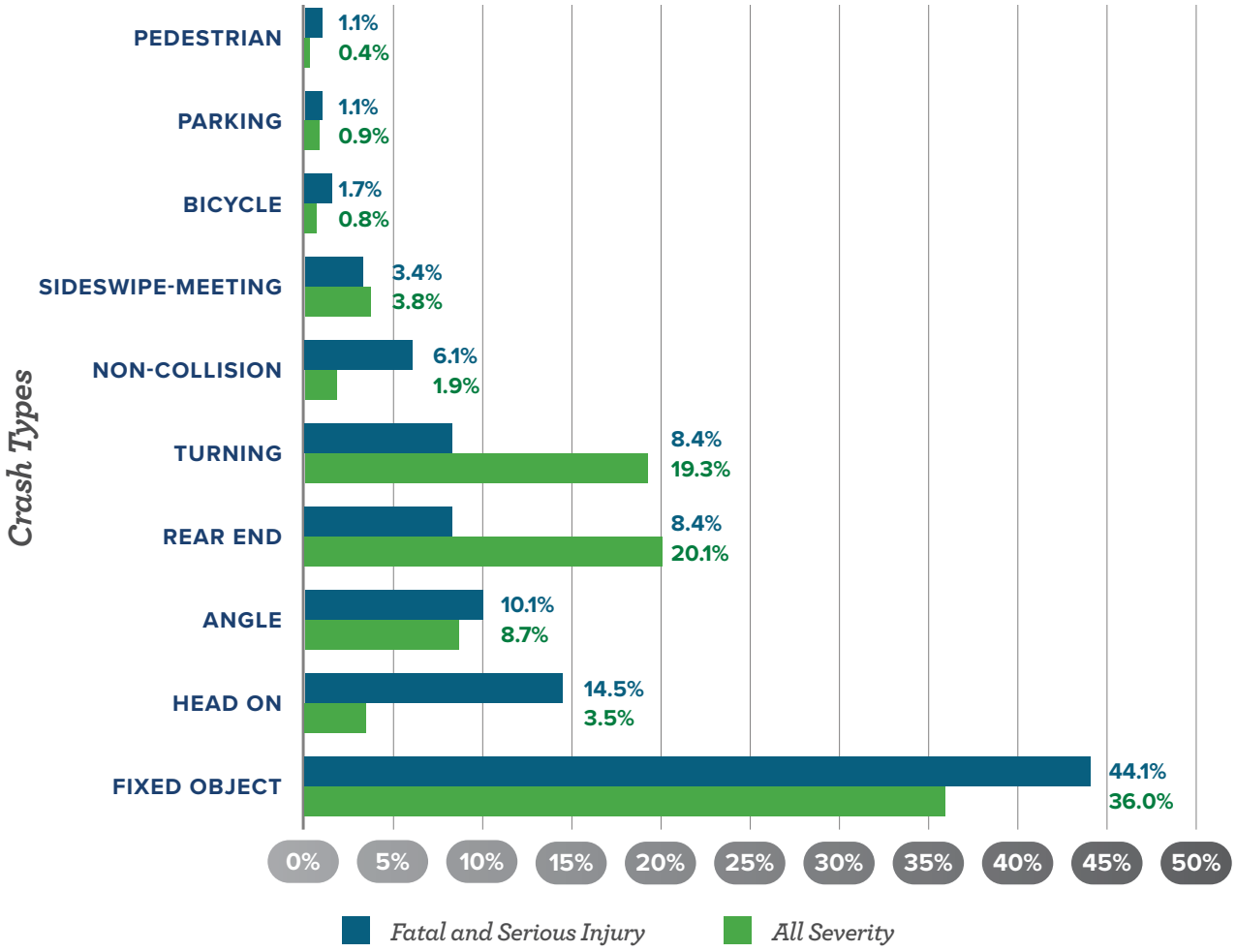


FIGURE 6. PROPORTIONS OF CRASH TYPES BY SEVERITY

TABLE 2. SUMMARY OF MARION COUNTY CRASH ATTRIBUTES

DATA ELEMENT	CRASH ATTRIBUTE	%OF ALL COLLISIONS WITH THIS ATTRIBUTE [A]	%OF F&A COLLISIONS WITH THIS ATTRIBUTE
COLLISION TYPE	Roadway or Lane Departure [B]	39.9%	**60.9%**
	Fixed Object	36.0%	**44.1%**
	Non-Collision/Overturning	1.9%	**6.1%**
	Head-On	3.5%	**14.5%**
	Turning	19.6%	8.9%
	Rear End	20.3%	8.9%
	Sideswipe – Meeting	3.8%	3.4%
CONTRIBUTING CIRCUMSTANCE (FOR AT LEAST ONE VEHICLE)	Exceeding Reasonable Safe Speed or Exceeding Stated Speed Limit	19.5%	**35.8%**
	Alcohol-Impaired	7.8%	**25.1%**
	Drug-Impaired	2.4%	**17.9%**
	Inattention / Distraction	8.1%	**11.7%**
MOTOR TYPE INVOLVED	Motorcycle	3.3%	**14.0%**
	Heavy Vehicle	5.2%	3.4%
LIGHTING CONDITION	Dark/Dusk/Dawn	28.9%	28.5%
ROADWAY CHARACTERISTIC	At Intersection or Intersection Related	37.3%	22.4%
	At Traffic Signal	3.6%	1.1%
	At Stop Sign	29.0%	19.0%
	Straight Segment	37.5%	**40.1%**
	Horizontal Curve	18.3%	**28.5%**
	Vertical Curve	0.2%	**2.8%**
	Alley or Driveway	8.7%	5.0%

[A] Crashes with multiple data elements are listed in each applicable row.

[B] Roadway or Lane Departure crashes include the following crash types: Fixed Object, Head-on, Non-collision/Overturning, Sideswipe – Meeting, Pedestrian (not in roadway), Other

[C] Percentages reflect injury crashes only as participant age is not recorded for property damage only (PDO) crashes.

DATA ELEMENT	CRASH ATTRIBUTE	%OF ALL COLLISIONS WITH THIS ATTRIBUTE [A]	%OF F&A COLLISIONS WITH THIS ATTRIBUTE
ROAD USER	Younger Pedestrian/Cyclist (Age <21) [C]	0.3%	0.0%
	Older Pedestrian/Cyclist (Age 64+) [C]	0.2%	**0.6%**
	Younger Driver	18.3%	**27.4%**
	Older Driver	6.5%	**13.4%**
ROAD SURFACE CONDITIONS	Wet	24.1%	19.6%
	Ice	2.5%	**3.9%**

[A] Crashes with multiple data elements are listed in each applicable row.

[B] Roadway or Lane Departure crashes include the following crash types: Fixed Object, Head-on, Non-collision/Overturning, Sideswipe – Meeting, Pedestrian (not in roadway), Other

[C] Percentages reflect injury crashes only as participant age is not recorded for property damage only (PDO) crashes.

High Injury Network

The high injury network (HIN) highlights the corridors and intersections that have experienced the highest frequency and severity of crashes in Marion County. The Equivalent Property Damage Only (EPDO) network screening methodology was used to identify these high injury locations. The EPDO methodology assigns a weighted value to each crash based on severity, where a fatal or serious injury crashes has an EPDO score of 100, a non-serious injury has a score of 10, and a non-injury PDO crash has a score of 1. These scores are then added together for each roadway segment and intersection in the network, and the scores are ranked from highest to lowest. **FIGURE 7** on the following page illustrates the HIN for Marion County.

Crash rates for all County roadways are included in the appendix.

While representing only 5% of the County's total road miles, the *HIN accounts for over 40% of all fatal and serious injury crashes.*

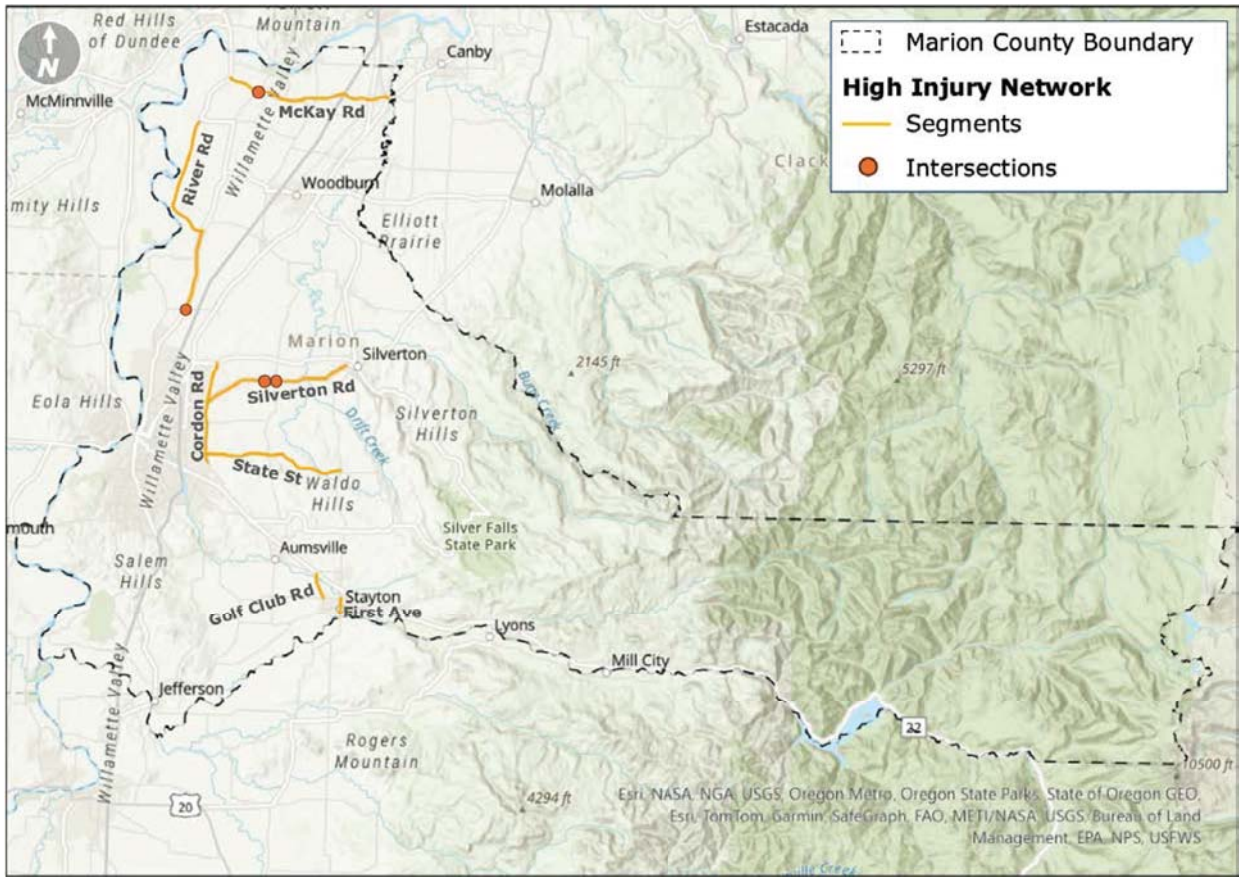


FIGURE 7. MARION COUNTY HIGH INJURY NETWORK MAP

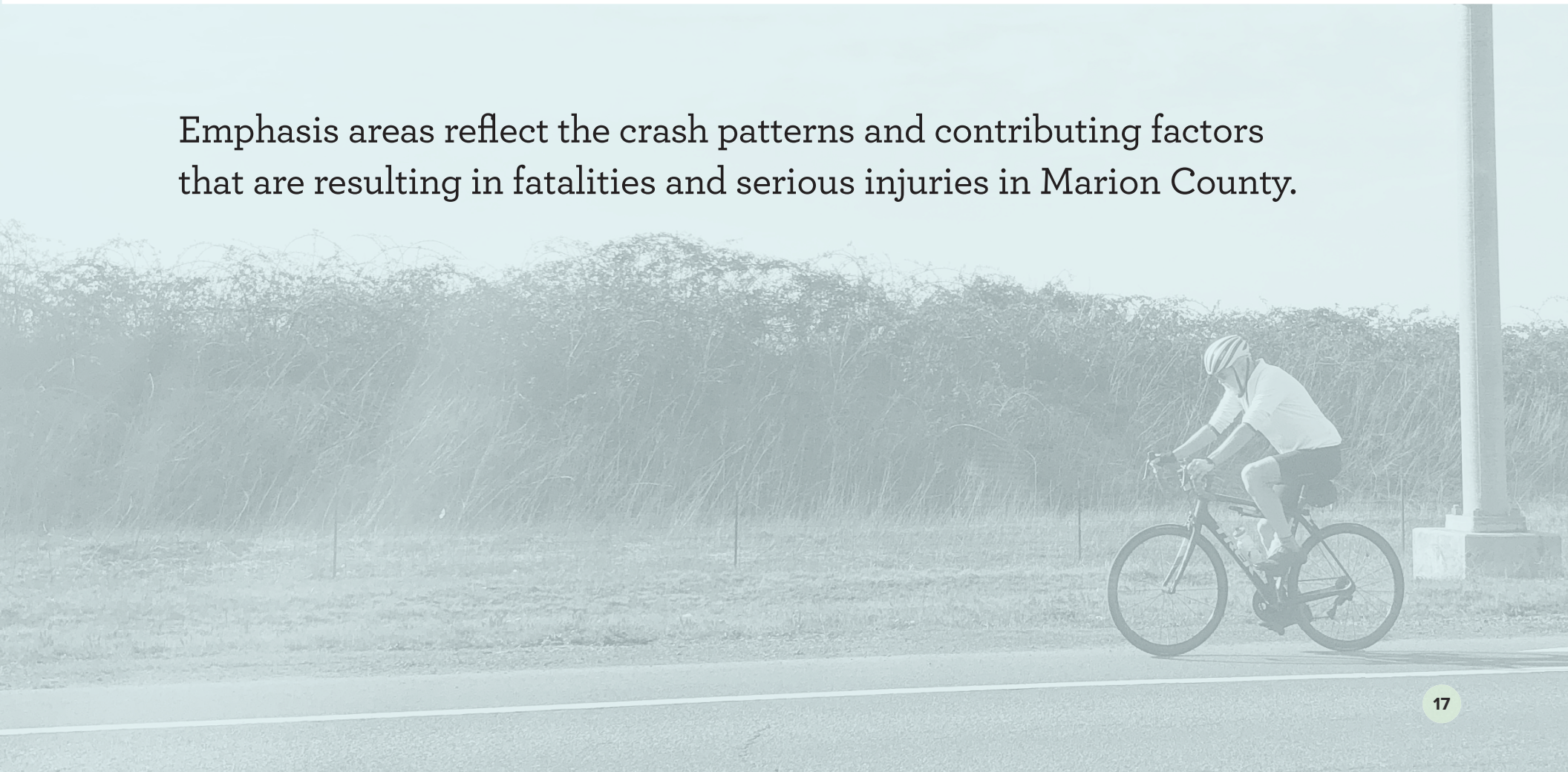
HIN LOCATIONS

SEGMENTS	EPDO PER MILE:
MCKAY/YERGEN/EHLEN RD *(RIVER RD NE TO MAIN ST)*	261
SILVERTON RD NE *(FOSSHOLM ST NE TO CORDON RD NE)*	82
CORDON RD NE *(HAZELGREEN RD NE TO WAGON WHEEL DR)*	874
N FIRST AVE *(SHAFF RD TO WATER ST)*	643
GOLF CLUB RD SE *(SOUTH OF SANTIAM HWY TO SHAFF RD)*	286
RIVER RD NE *(ST. PAUL CITY LIMITS TO BROOKLAKE RD)*	142
STATE ST *(CASCADE HWY NE TO CORDON RD NE)*	100

INTERSECTIONS	EPDO:
SILVERTON RD AT HOWELL PRAIRIE RD	255
SILVERTON RD AT 81ST AVE	331
MCKAY RD AT FRENCH PRAIRIE RD	256
BROOKLAKE RD AT RIVER RD	262

5 *Emphasis Areas*

Emphasis areas reflect the crash patterns and contributing factors that are resulting in fatalities and serious injuries in Marion County.



A data-driven evaluation identified a list of potential emphasis areas based on the crash types and attributes that are:

1. *Most common in Marion County*
2. *More common in Marion County than in other parts of Oregon*
3. *More likely to result in fatal or severe injuries*

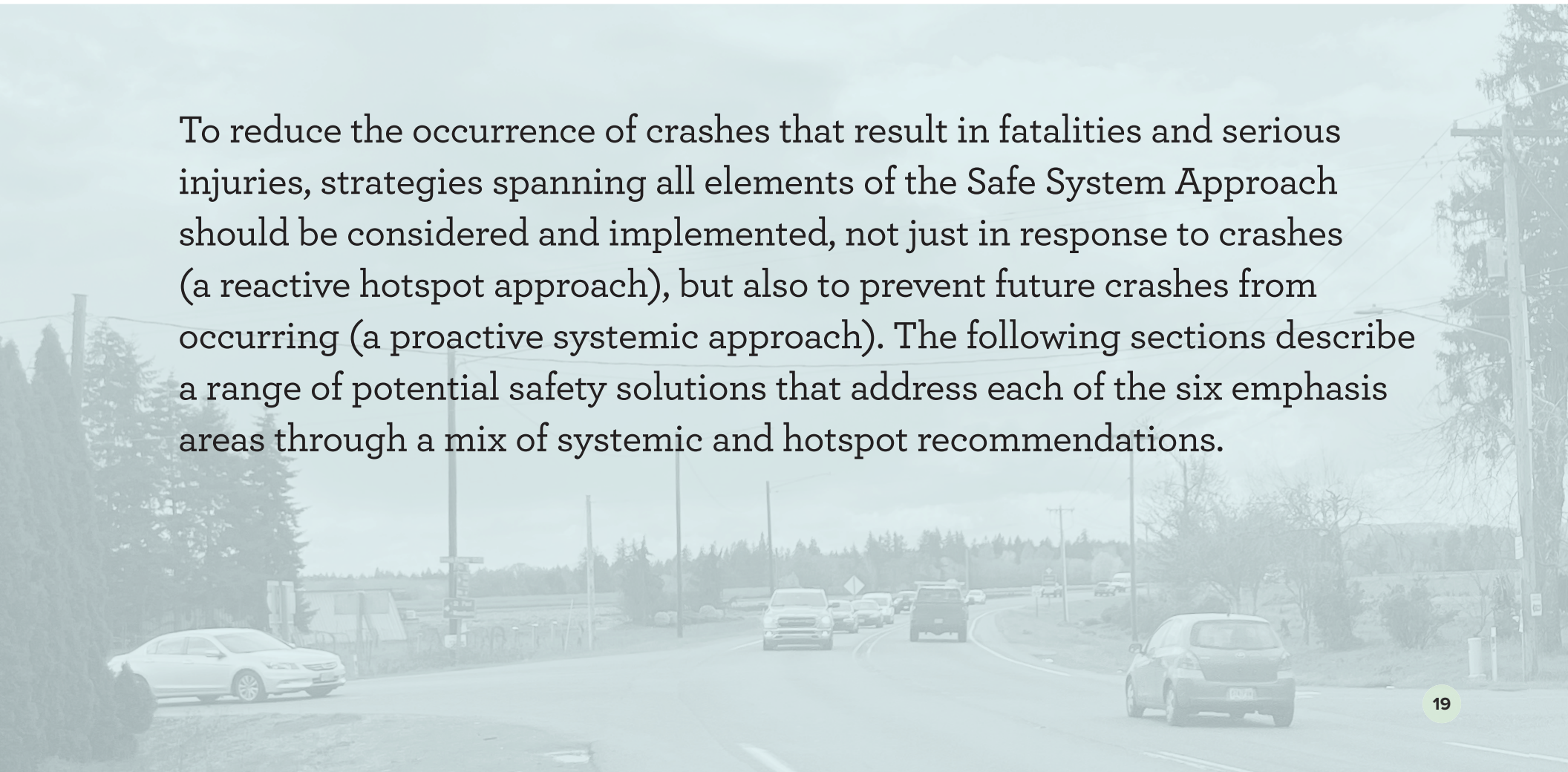
From the initial list of emphasis areas, the following six were chosen based on input from the community, stakeholders, and the Board of Commissioners:

- *Roadway and Lane Departure*
- *Impairment*
- *Pedestrians and Bicyclists*
- *Intersections*
- *School Zones (within a mile of a school)*
- *Risky Behaviors (speeding, distraction, and fatigue)*

More information on the safety needs and potential strategies for each emphasis area are described in the following section.

6 *Addressing Safety Needs*

To reduce the occurrence of crashes that result in fatalities and serious injuries, strategies spanning all elements of the Safe System Approach should be considered and implemented, not just in response to crashes (a reactive hotspot approach), but also to prevent future crashes from occurring (a proactive systemic approach). The following sections describe a range of potential safety solutions that address each of the six emphasis areas through a mix of systemic and hotspot recommendations.



The potential countermeasures encompass engineering solutions, education and enforcement initiatives, and other programs and strategies that can be applied throughout the County proactively. Implementing these recommendations will help create redundant and complementary safety mechanisms, employing a shared responsibility amongst road users, recognizing that humans make mistakes, and reducing the risk that those mistakes may result in death or serious injury. The countermeasures highlighted in **bold** are proven to provide a high safety benefit and should be prioritized in implementation.[1]

Systemic County-Wide Strategies

Systemic strategies address the risk of crashes based on roadway characteristics that may be correlated with high severity crashes. These locations may, or may not, have a history of severe crashes, but have characteristics that are similar to other sites where high severity crashes have occurred. By selecting locations based on roadway characteristics instead of crash history, safety treatments may help proactively reduce the risk of traffic deaths and life-changing injuries.

Lane and Roadway Departures

Between 2017 and 2021, there were 825 crashes where a driver crossed into the opposing lane or dropped off the roadway. Rural roadways typically have narrow shoulders, unrecoverable side slopes, higher speeds, and low law enforcement presence. Although the County cannot legally implement automated speed enforcement measures, the County should still collaborate with City and State partners to assist in the implementation of a robust speed management program.

The primary contributing factors to these crashes were speeding (38%) and other impairments (22%). Approximately 80% of these crashes were fixed-object crashes, and half of the objects were a roadside ditch.

Percent of all Marion County crashes:	**39.9%**
Percent of fatal and serious injury Marion County crashes:	**60.9%**

1 Proven safety countermeasures from ODOT's Crash Reduction Factor Manual: https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf

TABLE 3. POTENTIAL COUNTERMEASURES FOR RURAL ROAD OR LANE DEPARTURE CRASHES

	SAFE SYSTEM APPROACH	POTENTIAL COUNTERMEASURE
	SAFER VEHICLES	Advocate for in-vehicle technology for lane keeping and collision avoidance.
	SAFER SPEEDS	Install dynamic speed feedback signs.
	SAFER SPEEDS	Set appropriate posted speed limits, in compliance with current ODOT policies.
	SAFER ROADS	Install centerline and shoulder rumble strips.
	SAFER ROADS	Increase pavement friction by installing high friction surface treatment.
	SAFER ROADS	Provide a raised or traversable median.
	SAFER ROADS	Provide adequate clear zones and recoverable roadside environments.
	SAFER ROADS	Provide wider shoulders and safety edge treatment.
	SAFER ROADS	Install high visibility striping and signing on segments with horizontal curves.
	SAFER ROADS	Upgrade curve warning signing to include “required” treatments, as outlined in the Manual on Uniform Traffic Control Devices.
	POST-CRASH CARE	Support incident management who play a key role in improving safety for on scene responders and victims.
	POST-CRASH CARE	Support a robust communication network to ensure that crashes can be quickly reported to emergency services.

The following corridors have crash patterns and roadway characteristics that are suitable for systemic application of these countermeasures:

- Hazelgreen Road NE, M.P. 3.0 – 8.0
- River Road S, M.P. 0.0 – 5.0
- North Fork Road SE, M.P. 3.5 – 5.5
- Vitae Springs Road S, M.P. 1.5 – 4.0
- Sunnyview Road NE, M.P. 2.5 – 4.5
- McKay/Yergen/Ehlen Corridor, full extent

Impaired Drivers on Rural Roadways

Of the 2,066 crashes reported during the study period, 144 involved drivers impaired by alcohol-only, 31 were drug-only (four flagged for marijuana), and the remaining 18 involved both alcohol and drugs (three flagged for marijuana). Approximately 90% of these crashes took place in a rural environment, of which 75% also involved roadway departures.

Percent of all Marion County crashes:	**9.3%**
Percent of fatal and serious injury Marion County crashes:	**36.3%**

TABLE 4. POTENTIAL COUNTERMEASURES FOR IMPAIRED DRIVERS ON RURAL ROADWAYS

	SAFE SYSTEM APPROACH	POTENTIAL COUNTERMEASURE
	SAFER PEOPLE	Create an educational campaign targeting prevention of impaired driving.
	SAFER PEOPLE	Partner with local community organizations and agencies to provide opportunities for a free ride home if impaired (e.g., vouchers for ride share tickets, law enforcement provides a free ride home).
	SAFER PEOPLE	Partner with Public Health Agencies and existing Alcohol and Drug Prevention organizations to provide DUII education and outreach and support drug and alcohol prevention and treatment programs.
	SAFER PEOPLE	Develop impaired driver ride program to help impaired people reach home.
	SAFER ROADS	Provide a raised or traversable median.
	SAFER ROADS	Provide adequate clear zones and recoverable roadside environments.
	SAFER ROADS	Upgrade warning and regulatory signing with high visibility sheeting.
	POST-CRASH CARE	Support incident management who play a key role in improving safety for on-scene responders and victims.
	POST-CRASH CARE	Support a robust communication network to ensure that crashes can be quickly reported to emergency services.

Stop-Controlled Intersections on Rural Roadways

Within the five-year study period, 600 crashes took place at stop-controlled intersections according to the recorded traffic control data. The leading collision types include turning movement crashes (41%), angle crashes (27%), and rear-end crashes (19%). Not yielding the right of way caused approximately half of the crashes. Risky behaviors, including speeding and distracted driving, were overrepresented in the high severity crashes.

Percent of all Marion County crashes:	**29.0%**
Percent of fatal and serious injury Marion County crashes:	**19.0%**

TABLE 5. POTENTIAL COUNTERMEASURES FOR CRASHES AT STOP-CONTROLLED INTERSECTIONS

	SAFE SYSTEM APPROACH	POTENTIAL COUNTERMEASURE
	SAFER VEHICLES	Advocate for in-vehicle technology for collision avoidance.
	SAFER SPEEDS	Install dynamic speed feedback signs.
	SAFER ROADS	Improve alignment and install enhanced signing and striping treatments at rural “Y” intersections.
	SAFER ROADS	Install intersection visibility upgrades (“stop ahead” pavement markings, oversized stop signs, doubled-up stop signs, high visibility intersection warning signs, flashing beacons on warning signs, reflectorized tape on signposts, etc.).
	SAFER ROADS	Provide actuated flashing beacons triggered by approaching vehicles.
	SAFER ROADS	Increase pavement friction by installing high friction surface treatment.
	SAFER ROADS	Increase triangle sight distance.
	SAFER ROADS	Install left-turn and/or right-turn lanes on major road approaches, where appropriate.
	SAFER ROADS	Install roundabout from minor road stop control.

	SAFE SYSTEM APPROACH	POTENTIAL COUNTERMEASURE
	SAFER ROADS	Establish a regional asset management program for inventory and maintenance of signs, markings, guardrail, and streetlights.
	SAFER ROADS	Install transverse rumble strips on stop-controlled approaches when visibility of the intersection is restricted or when the need to stop ahead may be unexpected.
	SAFER ROADS	Invest in before-and-after evaluations of safety projects to determine the effectiveness of specific treatments.
	POST-CRASH CARE	Support incident management who play a key role in improving safety for on scene responders and victims.
	POST-CRASH CARE	Support a robust communication network to ensure that crashes can be quickly reported to emergency services.

The following corridors have crash patterns and roadway characteristics that are suitable for systemic application of these countermeasures:

- Cordon Road NE
- Silverton Road NE
- River Road NE
- Meridian Road NE
- Hazelgreen Road NE
- Parrish Gap Road SE

Pedestrians and Bicyclists

Within the study period, there were 9 recorded crashes involving a pedestrian and 16 crashes involving a cyclist on County-owned roadways. Ten of these crashes took place in urban areas, while fifteen others took place in rural areas (proportions are similar for both bicycle and pedestrian involved crashes). The three leading crash causes were not yielding the right-of-way (28%), inattention (20%), and non-motorist illegally in the roadway (20%).

Percent of all Marion County crashes:	**1.2%**
Percent of fatal and serious injury Marion County crashes:	**2.8%**

TABLE 6. POTENTIAL COUNTERMEASURES FOR CRASHES INVOLVING PEDESTRIANS OR CYCLISTS

	SAFE SYSTEM APPROACH	POTENTIAL COUNTERMEASURE
	SAFER PEOPLE	Create an educational campaign to encourage safe walking and biking behaviors (e.g., obeying traffic control devices, crossing at intersections or designated crossing locations, wearing reflective clothing at night, etc.).
	SAFER VEHICLES	Advocate for in-vehicle technology for collision avoidance.
	SAFER SPEEDS	Install dynamic speed feedback signs.
	SAFER ROADS	Install crosswalk visibility enhancements including advance yield markings, high visibility crosswalk markings, lighting, and supplemental signing and pavement markings.
	SAFER ROADS	Increase available sight distance at intersections and mid-block crossings.
	SAFER ROADS	Implement roadway design to be consistent with the surrounding context; provide for separation of modes based on context and use of the road.
	POST-CRASH CARE	Support incident management who play a key role in improving safety for on-scene responders and victims.
	POST-CRASH CARE	Support a robust communication network to ensure that crashes can be quickly reported to emergency services.

Risky Behaviors

Risky behaviors by road users have a significant effect on the frequency and severity of roadway crashes. Some of these crash attributes are choices a motorist makes before getting behind the wheel (e.g., drinking alcohol) and others are actions taken during a trip that put the driver and other road users at risk.

Besides impairment, other risky behaviors including speeding, inattention, fatigue, and recklessness were overrepresented in high severity crashes, and often contributed to the high severity crash types including fixed-object, head-on, and angle crashes.

Percent of all Marion County crashes:	**33.9%**
Percent of fatal and serious injury Marion County crashes:	**54.7%**

TABLE 7. POTENTIAL COUNTERMEASURES FOR CRASHES INVOLVING RISKY BEHAVIORS

	SAFE SYSTEM APPROACH	POTENTIAL COUNTERMEASURE
	SAFER PEOPLE	Create an educational campaign targeting prevention of risky driver behaviors such as speeding, distracted driving, and drowsy driving.
	SAFER VEHICLES	Advocate for in-vehicle technology for collision avoidance.
	SAFER SPEEDS	Install dynamic speed feedback signs.
	SAFER ROADS	Install guide signs to provide directional and mileage information to specific destinations.
	SAFER ROADS	Provide adequate clear zones and recoverable roadside environments.
	SAFER ROADS	Install advanced curve warnings flashers with existing signs.
	POST-CRASH CARE	Support incident management who play a key role in improving safety for on-scene responders and victims.
	POST-CRASH CARE	Support a robust communication network to ensure that crashes can be quickly reported to emergency services.

School Zones

Within the study period, 761 crashes, including nine fatal and 39 serious injury crashes, were reported within a mile of a school.[1] In total, nine of these crashes involved a bicyclist and five other crashes involved a pedestrian. Based on roadway functional classification, the majority of these crashes took place in rural environments (57%). The two leading crash causes were not yielding the right-of-way (24%) and failure to avoid the vehicle ahead (15%).

Percent of all Marion County crashes:	**36.8%***
Percent of fatal and serious injury Marion County crashes:	**26.8%***

*** within a mile of a school**

1 148 school locations within the County retrieved from OpenStreetMap, a free online database, accessed by DKS Associates April 2025.

TABLE 8. POTENTIAL COUNTERMEASURES FOR CRASHES IN RURAL SCHOOL ZONES

	SAFE SYSTEM APPROACH	POTENTIAL COUNTERMEASURE
	SAFER PEOPLE	Work with school districts to evaluate and implement best practices for traffic safety near schools, including on-site and off-site traffic management for all modes (pick-up/drop-off procedures, parking lot configurations, separation of travel modes, etc.).
	SAFER PEOPLE	Work with school districts to select safe locations for school bus stops or identify necessary improvements to ensure children can safely walk to and wait at bus stop locations.
	SAFER ROADS	Support the development of safe routes to school plans and associated educational activities aimed at safe walking and biking behaviors.
	SAFER ROADS	Create an educational campaign to encourage safe walking and biking behaviors (e.g., obeying traffic control devices, crossing at intersections or designated crossing locations, wearing reflective clothing at night, etc.).
	SAFER ROADS	Widen rural paved lane width.
	SAFER SPEEDS	Install dynamic speed feedback signs.
	SAFER VEHICLES	Advocate for in-vehicle technology for collision avoidance.
	POST-CRASH CARE	Support incident management who play a key role in improving safety for on-scene responders and victims.
	POST-CRASH CARE	Support a robust communication network to ensure that crashes can be quickly reported to emergency services.

High Injury Network Strategies & Prioritization

Eleven locations on the HIN were selected for the development of site-specific solutions. These 11 locations were prioritized using the following criteria:

1. **CRASH HISTORY**
2. **EMPHASIS AREAS**
3. **PUBLIC/STAFF CONCERNS**
4. **FUNDABILITY**

This data-driven approach ensures the most critical safety needs are addressed effectively and equitably. **TABLE 9** lists HIN locations based on which projects have the greatest potential to reduce severe crashes and improve safety for all road users. Crash history, presence of disadvantaged areas, and road and traffic information at individual sites were used to identify treatments for these high-crash locations. Note that there are several possible countermeasures (solutions) that could be employed to address the safety concerns at each location. The solutions listed in **TABLE 9** are the most feasible solutions, accounting for cost.

Because funding is limited, lower-cost solutions with most benefits are more likely to be implemented.

Each of the four criteria were considered in combination with input from County staff. **TABLE 9** summarizes the resulting priority ranking and recommended solutions for each HIN segment and intersection.

The following sections describe each location in more detail and conceptual designs for selected strategies are included in **Appendix E**.

TABLE 9. SUMMARY OF HIGH INJURY NETWORK STRATEGIES

LOCATION	PRIORITY RANKING	RECOMMENDATIONS
SEGMENTS		
MCKAY/YERGEN/EHLEN RD *(RIVER RD NE TO MAIN ST)*	1	• Modify the roadway and roadside design to encourage slower vehicle speeds. • Provide adequate clear zones and recoverable roadside environments. • Install systemic stop-controlled intersection visibility upgrades (“stop ahead” pavement markings, high visibility warning signs) • Install dynamic speed feedback signs. • Increase pavement friction by installing high friction surface treatment along curves. • Install any type of median barrier.

TABLE 9. SUMMARY OF HIGH INJURY NETWORK STRATEGIES (CONTINUED)

LOCATION	PRIORITY RANKING	RECOMMENDATIONS
SILVERTON RD NE *(FOSSHOLM ST NE TO CORDON RD NE)*	2	• Increase speed limit sign density. • Install dynamic speed feedback signs. • Install systemic stop-controlled intersection visibility upgrades ("stop ahead" pavement markings, oversized stop signs, high visibility warning signs). • Improve sight distance at stop-controlled intersections. • Adjust edgeline placement to provide 11' lanes and wider paved shoulders. • Provide safety edge for rural pavement edge drop-off. • Flatten rural side slopes. • Install shoulder rumble strips. • Install wider edgelines. • Remove/relocate fixed obstacles within 16 feet of roadside. • Install left turn lanes at major street approaches where appropriate.
CORDON RD NE *(HAZELGREEN NE TO WAGON WHEEL DR)*	3	• Install left turn lanes at major street approaches and right turn lanes where appropriate. • Safety Median (Center non-raised median). • Install an adjacent continuous multi-use path. • Install a roundabout or traffic signal at key intersections, as recommended in the Cordon-Kuebler Corridor Plan.
N FIRST AVE *(SHAFF RD TO WATER ST)*	4	• Install enhanced crossings including raised medians and rapid rectangular flashing beacons (RRFBs). • Install median refuge islands to shorten crossing distances for pedestrians. • Implement urban leading pedestrian/bicycle interval at signalized intersections. • Implement protected left-turn phasing at signalized intersections. • Convert green ball indications to flashing yellow arrow for permissive phases at signalized intersections. • Install traffic calming measures appropriate for roadway functional classification.

TABLE 9. SUMMARY OF HIGH INJURY NETWORK STRATEGIES (CONTINUED)

LOCATION	PRIORITY RANKING	RECOMMENDATIONS
GOLF CLUB RD SE *(SOUTH OF SANTIAM HWY TO SHAFF RD)*	5	• Reduce posted speed limit to 45 MPH (Set appropriate posted speed limits, in compliance with current ODOT policies). • Install systemic stop-controlled intersection visibility upgrades ("stop ahead" pavement markings, oversized stop signs, high visibility warning signs). • Provide safety edge for rural pavement edge drop-off. • Flatten rural side slopes. • Install no-passing zone for the entire length. • Install dynamic speed feedback signs. • Install wider edgelines. • Adjust edgeline placement to provide 11' lanes and wider paved shoulders.
RIVER RD NE *(ST. PAUL CITY LIMITS TO BROOKLAKE RD)*	6	• Provide safety edge for rural pavement edge drop-off. • Install centerline and shoulder rumble strips. • Widen shoulder. • Install wider edgelines. • Install recommended systemic rural horizontal curve improvements (chevron signs, oversized and high-visibility advance curve warning signs). • Remove/relocate fixed obstacles within 16 feet of roadside. • Install wildlife warning signs. • Install traffic calming measures appropriate for roadway functional classification.

TABLE 9. SUMMARY OF HIGH INJURY NETWORK STRATEGIES (CONTINUED)

LOCATION	PRIORITY RANKING	RECOMMENDATIONS
STATE ST *(CASCADE HWY NE TO CORDON RD NE)*	7	• Reduce posted speed limit west of 95th Avenue where access density increases (Set appropriate posted speed limits, in compliance with current ODOT policies) • Install dynamic speed feedback signs. • Install systemic stop-controlled intersection visibility upgrades (“stop ahead” pavement markings, oversized stop signs, high visibility warning signs) • Provide safety edge for rural pavement edge drop-off. • Flatten rural side slopes. • Install centerline and shoulder rumble strips. • Install wider edgelines. • Adjust edgeline placement to provide 11’ lanes and wider paved shoulders • Install recommended systemic rural horizontal curve improvements (chevron signs, oversized and high-visibility advance curve warning signs). • Remove/relocate fixed obstacles within 16 feet of roadside.
INTERSECTIONS		
SILVERTON RD AT HOWELL PRAIRIE RD	1	• Reduce posted speed limit to 45 MPH (Set appropriate posted speed limits, in compliance with current ODOT policies) • Install systemic stop-controlled intersection visibility upgrades (“stop ahead” pavement markings, oversized stop signs, high visibility warning signs) • Install transverse rumble strips on all approaches to warn motorists of the need to stop ahead. • Coordinate with school districts to evaluate and implement best practices for safety in school zones. • Install dynamic speed feedback signs. • Install wider edgelines.

TABLE 9. SUMMARY OF HIGH INJURY NETWORK STRATEGIES (CONTINUED)

LOCATION	PRIORITY RANKING	RECOMMENDATIONS
SILVERTON RD AT 81ST AVE	2	• Increase speed limit sign density. • Install dynamic speed feedback signs. • Install systemic stop-controlled intersection visibility upgrades (“stop ahead” pavement markings, oversized stop signs, high visibility warning signs) • Improve sight distance at stop-controlled intersections • Adjust edgeline placement to provide 11’ lanes and wider paved shoulders • Provide safety edge for rural pavement edge drop-off • Flatten rural side slopes • Install shoulder rumble strips • Install wider edgelines. • Remove/relocate fixed obstacles within 16 feet of roadside
MCKAY RD AT FRENCH PRAIRIE RD	3	• Install systemic stop-controlled intersection visibility upgrades (“stop ahead” pavement markings, oversized stop signs, high visibility warning signs). • Increase sight triangle by removing vegetation. • Install transverse rumble strips on minor road approaches. • Install delineation on centerlines and edgelines.
BROOKLAKE RD AT RIVER RD	4	• Reduce posted speed limit to 45 MPH (Set appropriate posted speed limits, in compliance with current ODOT policies) • Install systemic stop-controlled intersection visibility upgrades (“stop ahead” pavement markings, oversized stop signs, high visibility warning signs). • Install dynamic speed feedback signs. • Install transverse rumble strips on all approaches to warn motorists of the need to stop ahead. • Install traffic calming measures appropriate for roadway functional classification.

SEGMENT

#1 MCKAY/YERGEN/EHLEN ROAD *(RIVER ROAD NE TO MAIN STREET, AURORA)*

In February 2021, the McKay/Yergen/Ehlen corridor between River Road NE (OR HWY 219) and I-5, a 7-mile-long segment, became the first County-owned roadway to be designated a safety corridor in Oregon as part of a pilot program (House Bill 3213); previously, only state highways could have this special designation. This segment of the corridor was prioritized due to high cut-through traffic from I-5, people driving at excessive speeds, and higher than expected crash rates. The corridor primarily serves the rural communities and agriculture businesses between Aurora and St. Paul and is a commuter route for Canby-Newberg travelers.

FIGURE 8. MCKAY/YERGEN/EHLEN CORRIDOR CROSS SECTION

Marion County Public Works has installed a few safety enhancements including centerline rumble strips and wider striping (**FIGURE 8**); larger speed limit, warning, and stop signs; additional pavement markings; designated no passing zones, and dynamic speed feedback signs.[1] Still, throughout the corridor the roadside environment consisting of sharp roadway drop offs, fixed objects, and heavy vegetation, could be improved to reduce severe outcomes of crashes.

1 Marion County Public Works News Posting, Marion County becomes first in state to designate local safety corridor, Feb. 2021 full access online: https://www.co.marion.or.us/pages/news.aspx?NewsId=673

Existing Conditions

- **Corridor Details:** There is an increased risk of high-severity crashes due to vegetation, curves, and excessive speeds. There are guardrails installed along the edge lines of some sections. There is minimal lighting along the corridor.
- **Crash History:** This segment has a fatal and serious injury crash history. Crash data supports commmunity concerns about safety at intersections. A third of crashes were intersection related (45 of 125) while a quarter were roadway departure (31 of 125). Among the roadway departure crashes, about a third involved vehicles crossing the centerline (11 of 31) of which nearly half were high severity crashes (5 of 11). The leading crash type on the corridor is rear-end (64 of 125) and the cause is failure to avoid the vehicle ahead (42 of 125). Most crashes (101) took place during daylight conditions.

Potential Solutions [2]

- **Modify the roadway and roadside design to encourage slower vehicle speeds.**
- **Provide adequate clear zones and recoverable roadside environments.**
- **Install systemic stop-controlled intersection visibility upgrades (“stop ahead” pavement markings, high visibility warning signs).**
- **Install dynamic speed feedback signs.**
- **Increase pavement friction by installing high friction surface treatment along curves.**
- **Install any type of median barrier.**
- Create an educational campaign targeting prevention of risky driver behaviors including speeding and impaired driving.
- Streamline the DUII arrest and adjudication processes to reduce repeat-offenses.
- Install roundabouts.
- Safety Median (Center non-raised median).

2 Solutions in **BOLD** are the most feasible solutions, accounting for cost.

SEGMENT

#2 SILVERTON ROAD NE *(FOSSHOLM STREET NE TO CORDON ROAD NE)*

The Silverton Road NE corridor originates in Salem at the Oregon State Fair Grounds and continues east as a highway (OR HWY 213) to Silverton with uninterrupted flow on Silverton Road NE (posted speed of 55 MPH). The County-owned segment of the corridor originates at Lancaster Drive NE with the highest risk for a high severity crash stretches about 9 miles. This corridor serves the nearby residential communities as well as the surrounding agriculture and commuter traffic between Silverton and Salem.

Two intersections along this corridor were flagged for having higher than expected crash rates (81st Avenue NE and Howell Prairie Road). Community feedback indicates high speeds are a safety concern throughout the corridor, particularly while turning on and off Silverton Road NE, as well as sight distance obstructions (e.g., electric poles, vegetation, etc.) as shown in **FIGURE 9**. Overall, the crash patterns along this roadway segment include high rates of lane and roadway departures, impaired drivers, and risky behaviors.

FIGURE 9. SILVERTON ROAD NE CORRIDOR CROSS SECTION (FACING WEST)

Existing Conditions

- **Corridor Details:** This segment has an increased risk of crashes due to high speeds, unforgiving infrastructure, and unsafe driver behaviors. Limited street lighting is provided through the corridor.
- **Crash History:** This segment has fatal and serious injury crash history. Over half of the corridor crashes were intersection related (59 of 115). The leading collision type was a rear-end (49 of 115) while the leading contributing factor was failing to avoid the vehicle ahead. About a quarter of crashes took place in dark/dawn/dusk conditions (31 of 115).

Potential Solutions [1]

- **Increase speed limit sign density.**
- **Install dynamic speed feedback signs.**
- **Install systemic stop-controlled intersection visibility upgrades (“stop ahead” pavement markings, oversized stop signs, high visibility warning signs).**
- **Improve sight distance at stop-controlled intersections.**
- **Adjust edgeline placement to provide 11’ lanes and wider paved shoulders.**
- **Provide safety edge for rural pavement edge drop-off.**
- **Flatten rural side slopes.**
- **Install shoulder rumble strips.**
- **Install wider edgelines.**
- **Remove/relocate fixed obstacles within 16 feet of roadside.**
- **Install left turn lanes at major street approaches where appropriate.**

[1] Solutions in **BOLD** are the most feasible solutions, accounting for cost.

SEGMENT

#3 CORDON ROAD NE *(HAZELGREEN ROAD NE TO WAGON WHEEL DRIVE)*

The Cordon Road NE corridor stretches across the eastern edge of the urban Salem-Keizer metropolitan area, serving both local and regional traffic. On the west side of the corridor are residential communities, businesses, schools, among other activities of interest while the east side is largely undeveloped, yet provides access to smaller cities east of Salem, including Silverton and Turner. **FIGURE 10** illustrates a typical cross-section along Cordon Road. The corridor is under both Marion County and City of Salem jurisdiction at different points on the corridor. The County-owned segment of the corridor originates at Hazelgreen Road and extends to Caplinger Road.

Community feedback indicates high speeds are a safety concern throughout the corridor, particularly while turning on and off Cordon Road NE. Overall, the crash patterns along this roadway segment include high rates of intersection crashes and risky behaviors.

FIGURE 10. CORDON ROAD NE CORRIDOR CROSS-SECTION

Existing Conditions

- **Corridor Details:** This segment has an increased risk of crashes due to high speeds, unsafe driver behaviors, and unforgiving infrastructure.
- **Crash History:** This segment has fatal and serious injury crash history. Approximately three quarters of the corridor crashes were intersection related (238 of 329). The leading collision type was a rear end (166 of 329) while the leading contributing factor was failing to avoid the vehicle ahead (100 of 329). Risky behaviors were involved in 44 percent of crashes resulting in a fatality or serious injury (14 of 32).

Potential Solutions [1]

- **Increase speed limit sign density.**
- **Install dynamic speed feedback signs.**
- **Install traffic calming measures appropriate for roadway functional classification.**
- Install left turn lanes at major street approaches and right turn lanes where appropriate.
- Safety Median (Center non-raised median).
- Install an adjacent continuous multi-use path.
- Install a roundabout or traffic signal at key intersections, as recommended in the Cordon-Kuebler Corridor Plan.

[1] Solutions in **BOLD** are the most feasible solutions, accounting for cost.

SEGMENT

#4 N FIRST AVENUE *(SHAFF ROAD TO WATER STREET)*

Approximately 12 miles southeast of Salem, the N First Avenue corridor in Stayton serves the regional agricultural and light manufacturing businesses. The corridor originates from Cascade Highway SE in the north, bisects the City's designated commercial zone, and feeds into downtown Stayton on the southern end. This three-lane major arterial is the main north-south route through the City, providing a connection to local key destinations including schools, sports fields, the Stayton Public Library, the Santiam River, and Riverfront Park. The Stayton Police Department recently partnered together with the Stayton Library to host a free, traffic safety-themed summer camp for 5- & 6-year-olds with local middle school and high school aged students serving as camp counselors.

FIGURE 11. FIRST AVENUE (STAYTON) CROSS-SECTION (LOOKING NORTH)

The Level of Traffic Stress (LTS) was analyzed for existing pedestrian and bicycle facilities along the corridor using methodology from ODOT's Analysis and Procedures Manual (APM). Within the neighborhood commercial land use and at the posted speed limit of 30 MPH, this corridor presents moderate levels of traffic stress (LTS 3) for people walking or riding bicycles considering there are sidewalks on both sides of the corridor, but they are not wide enough to allow for passing and there are no bicycle facilities to provide separation among the various modal users (**FIGURE 11**). These conditions are able to serve most observant, adult cyclists that may feel uncomfortable but safe using these facilities.

Existing Conditions

- **Corridor Details:** This segment has an increased risk of crashes due to high speeds, unforgiving infrastructure, and unsafe driver behaviors. Limited street lighting is provided through the corridor.
- **Crash History:** This segment has fatal and serious injury crash history. Over a quarter of the corridor crashes involved road departure (59 of 115). The leading collision type was a fixed object (28 of 97) while the leading contributing factor was not yielding the right of way (22 of 97). About a third of crashes took place in dark/dawn/dusk conditions (33 of 97).

Potential Solutions [1]

- **Install enhanced crossings including raised medians and rapid rectangular flashing beacons (RRFBs).**
- **Install median refuge islands to shorten crossing distances for pedestrians.**
- **Implement urban leading pedestrian/bicycle interval at signalized intersections.**
- **Implement protected left-turn phasing at signalized intersections**
- **Convert green ball indications to flashing yellow arrow for permissive phases at signalized intersections**
- **Install traffic calming measures appropriate for roadway functional classification.**
- Implement access management strategies to reduce conflicts at driveways
- Install ADA accessible ramps at intersections
- Install bicycle lanes (with buffer) on both sides of corridor.
- Install separated shared-use path separated on one side of corridor.

[1] Solutions in **BOLD** are the most feasible solutions, accounting for cost.

SEGMENT

#5 GOLF CLUB ROAD SE *(SOUTH OF SANTIAM HWY TO SHAFF ROAD)*

The Golf Club Road SE corridor stretches about 2 miles from North Santiam Highway SE (OR HWY 22) to the northwest side of Stayton, providing direct access to the Santiam Golf Club, commercial business, as well as serving the surrounding residential communities, agriculture, and commuters between Stayton and Salem. This two-lane minor arterial provides uninterrupted flow (posted speed of 45/50 MPH) between OR HWY 22 and Stayton.

While the roadway grade is fairly flat, the 1-foot paved shoulders sharply drop off into a ditch and vegetation and mailboxes are just beside the roadway as shown in **FIGURE 12**. The Shaff Road intersection is a hotspot at the end of the corridor within the commercial area, accounting for about half of the crashes along the corridor. Seven of the sixteen intersection crashes were rear-end crashes between vehicles headed southbound.

FIGURE 12. GOLF CLUB ROAD SE CORRIDOR CROSS SECTION (FACING NORTH)

Existing Conditions

- **Corridor Details:** This segment has an increased risk of crashes due to high speeds and unforgiving infrastructure.
- **Crash History:** This segment has fatal and serious injury crash history. The leading contributing factor was not yielding the right of way. Majority of crashes (28 of 32) took place in daylight conditions.

Potential Solutions [1]

- **Reduce posted speed limit to 45 MPH (Set appropriate posted speed limits, in compliance with current ODOT policies).**
- **Install systemic stop-controlled intersection visibility upgrades (“stop ahead” pavement markings, oversized stop signs, high visibility warning signs).**
- **Provide safety edge for rural pavement edge drop-off.**
- **Flatten rural side slopes.**
- **Install no-passing zone for the entire length.**
- **Install dynamic speed feedback signs.**
- **Install wider edgelines.**
- **Adjust edgeline placement to provide 11’ lanes and wider paved shoulders.**

[1] Solutions in **BOLD** are the most feasible solutions, accounting for cost.

SEGMENT

#6 RIVER ROAD NE *(ST. PAUL CITY LIMITS TO BROOKLAKE ROAD)*

The River Road NE corridor extends from St. Paul to rural Salem; the corridor is fast, posted at 55 MPH, and has nearly uninterrupted flow between the two cities besides two stop-controlled intersections at French Prairie Road and Brooklake Road NE. There are some surrounding residencies along the corridor, but the corridor primarily serves the agriculture, businesses, and commuter traffic between St. Paul and Salem.

There are higher than expected crash rates along this segment partially due to the terrain that is comprised of many curves, narrow shoulders, and heavy vegetation which make for an unforgiving roadside environment as shown in **FIGURE 13**. Additionally, the crashes along this corridor had higher rates of road departures, impaired drivers, and risky behaviors than other County-owned roadways. Community feedback indicates high speeds are a safety concern throughout the corridor as well as children waiting for buses and animals crossing the road.

FIGURE 13. RIVER ROAD NE CROSS-SECTION

Existing Conditions

- **Corridor Details:** This segment has an increased risk of crashes due to high speeds, unforgiving infrastructure, and unsafe driver behaviors. Limited street lighting is provided through the corridor.
- **Crash History:** This segment has fatal and serious injury crash history. Over a quarter of the corridor crashes involved road departure (59 of 115). The leading collision type was a fixed object (28 of 97) while the leading contributing factor was not yielding the right of way (22 of 97). About a third of crashes took place in dark/dawn/dusk conditions (33 of 97).

Potential Solutions [1]

- **Provide safety edge for rural pavement edge drop-off.**
- **Install centerline and shoulder rumble strips.**
- **Widen shoulder.**
- **Install wider edgelines.**
- **Install recommended systemic rural horizontal curve improvements (chevron signs, oversized and high-visibility advance curve warning signs).**
- **Remove/relocate fixed obstacles within 16 feet of roadside.**
- **Install wildlife warning signs.**
- **Install traffic calming measures appropriate for roadway functional classification.**

[1] Solutions in **BOLD** are the most feasible solutions, accounting for cost.

SEGMENT

#7 STATE STREET *(CASCADE HWY NE TO CORDON ROAD NE)*

The State Street corridor originates in Salem at the Riverfront City park. The County-owned segment of the corridor with the highest risk for a high severity crash stretches about 7 miles between rural west Salem and Cascade Highway NE which provides the most direct east-west connection to Silverton, Sublimity, and Stayton). This corridor serves the surrounding residential communities, businesses, and agriculture. This part of the corridor is fast, posted at 45 MPH, and only has a single stop about halfway at the Howell Prairie Road NE intersection.

There are higher than expected crash rates along this segment partially due to the terrain that is comprised of curves and heavy vegetation which make for an unforgiving roadside environment as shown in **FIGURE 14**. At the same time, the crashes along this corridor had higher rates of road departures, impaired drivers, and risky behaviors.

FIGURE 14. STATE STREET CORRIDOR CROSS SECTION

Existing Conditions

- **Corridor Details:** This segment has an increased risk of crashes due to high speeds, unforgiving infrastructure, and unsafe driver behaviors. Limited street lighting is provided through the corridor.
- **Crash History:** This segment has fatal and serious injury crash history. The leading contributing factor was a fixed object. Over a third of crashes (14 of 37) took place in dark/dusk conditions. About half of the recorded corridor crashes were related to risky behaviors (18 of 37) or to intersections (17 of 37). More than half of high severity crashes involved an impaired driver or road deprature (4 of 7).

Potential Solutions [1]

- **Reduce posted speed limit west of 95th Avenue where access density increases (Set appropriate posted speed limits, in compliance with current ODOT policies).**
- **Install dynamic speed feedback signs.**
- **Install systemic stop-controlled intersection visibility upgrades (“stop ahead” pavement markings, oversized stop signs, high visibility warning signs).**
- **Provide safety edge for rural pavement edge drop-off.**
- **Flatten rural side slopes.**
- **Install centerline and shoulder rumble strips.**
- **Install wider edgelines.**
- **Adjust edgeline placement to provide 11’ lanes and wider paved shoulders.**
- **Install recommended systemic rural horizontal curve improvements (chevron signs, oversized and high-visibility advance curve warning signs).**
- **Remove/relocate fixed obstacles within 16 feet of roadside.**

[1] Solutions in **BOLD** are the most feasible solutions, accounting for cost.

INTERSECTION

#1 SILVERTON ROAD AT HOWELL PRAIRIE ROAD

While this intersection is in a rural environment according to the roads' functional classification, there is relatively high motor vehicle activity due to the Central Howell Elementary School on the southeast corner of intersection, also a gas station, drive-thru coffee stand, and a church in the vicinity. Both approaching legs have a relatively high posted speed of 55 mph. This is the only all-way stop-controlled intersection on Silverton Road (OR HWY 213) between Silverton and Hayesville, approximately a nine-mile stretch. This intersection serves the surrounding residential communities, agriculture, and commuters between Silverton and Salem.

There are school zone warning signs, speed limit signs, and 'school' pavement markings on each leg leading to the intersection. There is also an overhead red flashing beacon at the intersection (**FIGURE 15**).

FIGURE 15. SILVERTON ROAD/HOWELL PRAIRIE ROAD INTERSECTION (WEST LEG, LOOKING EAST)

Existing Conditions

- **Location Details:** AWSC intersection within a school zone, but still high-speed corridors approaching (posted as 55 mph). Sight distance for minor street is limited by vegetation and slight horizontal curve. The orientation of crossing traffic to the waiting driver makes it more difficult to detect and judge the speed of approaching vehicles. Existing standard crosswalks were recently restriped. No street lighting is present.
- **Crash History:** This location has a serious injury crash history. Crash data supports commmunity concerns about turning left onto minor street and high traffic volumes on HWY 213. Most crashes took place during daylight conditions. Leading crash cause is not yielding the right of way. Majority of left turn crashes are from the major street.

Potential Solutions [1]

- **Reduce posted speed limit to 45 MPH (Set appropriate posted speed limits, in compliance with current ODOT policies).**
- **Install systemic stop-controlled intersection visibility upgrades ("stop ahead" pavement markings, oversized stop signs, high visibility warning signs).**
- **Install transverse rumble strips on all approaches to warn motorists of the need to stop ahead.**
- **Install wider edgelines.**
- **Coordinate with school districts to evaluate and implement best practices for safety in school zones.**
- **Install dynamic speed feedback signs.**
- Install a roundabout.
- Install signal and left turn pockets on each approach leg.

[1] Solutions in **BOLD** are the most feasible solutions, accounting for cost.

INTERSECTION

#2 SILVERTON ROAD AT 81ST AVENUE

This intersection is just west of Howell Prairie Road, serving the same rural area between Silverton and Hayesville, which includes agriculture and residential communities. 81st Avenue does not serve as many volumes as Howell Prairie Road, but it is more skewed and has a smaller turning radius that drops off into a ditch on every approach (**FIGURE 16** and **FIGURE 17**). While sight distance is clearer from the minor road, the north leg increases in elevation, making it more difficult to detect and judge the speed of approaching vehicles (**FIGURE 17**).

Overall, there were seven crashes at the center of this intersection, of which four involved a driver under the age of 21. All three angle crashes involved a westbound vehicle and a northbound vehicle. The crash cause for all was not yielding the right of way. The two rear-end crashes involved northbound vehicles and were caused by failing to avoid the vehicle ahead. A sideswipe overtaking collision between two passenger vehicles caused one vehicle to make an avoiding maneuver that landed them in the ditch. The head-on collision was between two passenger vehicles on the major road, which involved a driver impaired by alcohol.

FIGURE 16. (TOP) SILVERTON ROAD/81ST AVENUE NE INTERSECTION (SOUTH LEG, LOOKING EAST)

FIGURE 17. (BOTTOM) SILVERTON ROAD/81ST AVENUE NE INTERSECTION (SOUTH LEG, LOOKING NORTH)

Existing Conditions

- **Corridor Details:** TWSC intersection with high-speed approaches (posted speed 55 mph) and unforgiving roadside. No street lighting is present.
- **Crash History**: This location has a fatal and serious injury crash history. Crash data supports commmunity concerns about high traffic volumes on HWY 213. All crashes involved a northbound vehicle. Most crashes took place during daylight conditions (5 of 7).

Potential Solutions [1]

- **Install systemic stop-controlled intersection visibility upgrades ("stop ahead" pavement markings, oversized stop signs, high visibility warning signs).**
- **Install transverse rumble strips on minor approaches to warn motorists of the need to stop ahead.**
- **Install dynamic speed feedback signs.**
- Install a roundabout.
- Install Intersection Conflict Warning System for safety in school zones.

[1] Solutions in **BOLD** are the most feasible solutions, accounting for cost.

INTERSECTION

#3 MCKAY ROAD AT FRENCH PRAIRIE ROAD

About five-miles west of Interstate-5 (I-5), this two-way stop-controlled (TWSC) intersection is about halfway between St. Paul and Donald, serving the nearby residential communities as well as the surrounding agriculture and commuter traffic accessing I-5.

Community feedback indicates high speeds are a safety concern at this location, particularly while turning from the minor roadway. **FIGURE 18** displays the vegetation, intersection skew, and nearby horizontal curve limiting the available sight distance for the minor roadway.

Although the County cannot legally implement automated speed enforcement measures, the County should still collaborate with City and State partners to assist in the implementation of a robust speed management program through updated guides and policies.

FIGURE 18. MCKAY ROAD/FRENCH PRAIRIE ROAD INTERSECTION (EAST LEG, LOOKING WEST)

Existing Conditions

- **Location Details:** Skewed TWSC intersection with high-speed approaches (posted speed 55 mph). Intersection skew, nearby horizontal curve, and vegetation limit the available sight distance. No street lighting is present. Dynamic speed feedback signs were recently installed along McKay Road.
- **Crash History:** This location has a serious injury crash history. Crash data supports commmunity concerns about speeding, high traffic volumes on major street, and challenges turning left. Most crashes took place during daylight conditions. Leading crash cause is not yielding the right of way. Left-turn crashes are all from minor street.

Potential Solutions [1]

- **Install systemic stop-controlled intersection visibility upgrades ("stop ahead" pavement markings, oversized stop signs, high visibility warning signs).**
- **Increase sight triangle by removing vegetation.**
- **Install transverse rumble strips on minor road approaches.**
- **Install delineation on centerlines and edgelines.**
- Reduce intersection skew angle.
- Install left turn lanes on major road approaches.
- Install a roundabout.

[1] Solutions in **BOLD** are the most feasible solutions, accounting for cost.

INTERSECTION

#4 BROOKLAKE ROAD AT RIVER ROAD

This all-way stop-controlled intersection in northern rural Salem serves the surrounding agriculture, freight and trucking-related businesses, as well as the residential communities of Brooks-Hopmere, commuter traffic accessing I-5, and regional community destinations such as Chemeketa Community College Brooks Campus and Willamette Mission State Park. Brooklake Road and River Road are also designated detour routes. In 2020, the safety and operations of this intersection were assessed as part of the Brooks Interchange Area Management Plan (IAMP).[1] This study found that the intersection was over capacity due to the high westbound/southbound volumes and exceeded Marion County standards. Queues on the westbound approach were noted as extending back across the Portland and Western Railroad (PNWR) tracks and could block driveway access during peak conditions. At least one of the preliminary signal warrants were met under existing (2020) conditions, while both were met under no-build future (2043) conditions.

There is an overhead red flashing beacon at the intersection but the intersection skew, fixed objects, and building on the northwest corner limit the available sight distance (**FIGURE 19**).

FIGURE 19. BROOKLAKE ROAD/RIVER ROAD INTERSECTION (WEST LEG, LOOKING EAST)

1 Brooks Interchange Area Management Plan (I-5 Exit 263) prepared by David Evans and Associates, Inc. for ODOT (Nov. 2022) full access online: https://www.oregon.gov/odot/Projects/Project%20Documents/2022-11-23_Final_BrooksIAMP.pdf

Existing Conditions

- **Location Details:** AWSC skewed intersection with high-speed approaches (posted speed 55 mph). Sight distance is limited by approach orientation, fixed objects, and building on NW corner. No street lighting is present.
- **Crash History:** This location has a serious injury crash history. The leading crash cause is failure to avoid the vehicle ahead, particuraly on the south leg headed northbound. Most crashes took place during daylight conditions. Commmunity concerns are related to turning left onto/from Brooklake Road due to high volumes and drivers not yielding the right of way.

Potential Solutions [2]

- **Reduce posted speed limit to 45 MPH (Set appropriate posted speed limits, in compliance with current ODOT policies).**
- **Install systemic stop-controlled intersection visibility upgrades (“stop ahead” pavement markings, oversized stop signs, high visibility warning signs).**
- **Install dynamic speed feedback signs.**
- **Install transverse rumble strips on all approaches to warn motorists of the need to stop ahead.**
- **Install traffic calming measures appropriate for roadway functional classification.**
- Realign intersection to improve sight distance and tighten curb radii.
- Install a roundabout.
- Install a traffic signal.

2 Solutions in **BOLD** are the most feasible solutions, accounting for cost.

Policy, Process, and Standards Improvements

In addition to implementing projects, there is an opportunity for Marion County to update, modify, or develop new policies, processes, and standards to better prioritize safety and align with the ultimate goal of eliminating fatal and serious injury crashes on Marion County roadways. An assessment of the County's Transportation System Plan, Design Standards, and Traffic Impact Analysis (TIA) Guidelines, as well as coordination with County staff, led to the following recommendations.

- Modify the County's Traffic Impact Analysis (TIA) guidelines to require safety evaluations and establish provisions for private developers to mitigate safety deficiencies in addition to capacity and mobility considerations.
- Update the County's access management policy to align with national best practices for access control, spacing, and design.
- Institute a "safety review" of all capital projects to identify low-cost safety enhancements that can be incorporated into designs prior to construction.

Toolbox of Safety Strategies

A comprehensive toolbox of safety strategies is included in the appendix. These strategies align with the ODOT Crash Reduction Factor (CRF) Manual, the Federal Highway Administration's Proven Safety Countermeasures, and the National Highway Traffic Safety Administration's *Countermeasures That Work, 11th Edition*. These strategies can be used as a reference to develop future safety improvement projects at locations not included in this plan, or as crash patterns change in the future.

High-Priority Safety Strategies

The list of strategies below are designated by the County as high priority. These are the safety strategies that the County will look to implement first when evaluating a high-crash location as these are aimed at addressing the County's specific crash history and contributing factors to high severity and high frequency crashes. See the following pages for detailed descriptions and crash modification factors for these high-priority strategies.

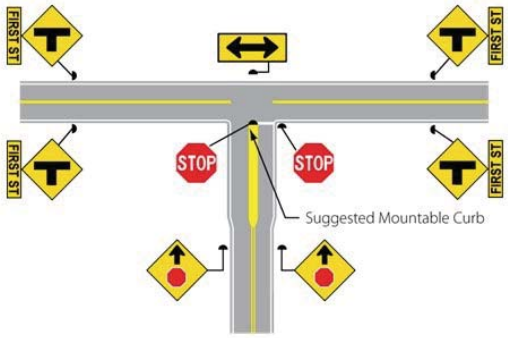
- Improve intersection warning
- Increase pavement friction by installing high friction surface treatment
- Provide actuated flashing beacons triggered by approaching vehicles at unsignalized intersections
- Install speed feedback signs
- Provide a raised median on multilane road
- Provide a safety edge
- Increase triangle sight distance
- Install wider edgelines
- Install chevron signs on rural horizontal curves
- Provide flashing beacons at minor-road stop-controlled intersections
- Promote educational transportation safety campaigns

IMPROVE INTERSECTION WARNING

EMPHASIS AREA(S):
Intersection

SAFE SYSTEM APPROACH OBJECTIVE(S): Safer Roads

EFFECTIVENESS:
20% (1–2 countermeasures), 25% (3–4 countermeasures), 30% (5–7 countermeasures) reduction in all crashes at all severities[1]



Source: https://highways.dot.gov/safety

DESCRIPTION: Improvements to intersection warning elements for unsignalized intersections can be achieved through use of several proven low-cost countermeasures including:

- Doubled-up or oversize advanced intersection warning signs with street name plaques
- Doubled-up or oversized advanced "Stop Ahead" signs
- Doubled-up or oversized "STOP" signs
- Installation of a minimum 6-foot wide raised splitter island on the stop approach (without pavement widening)
- Properly placed stop bar
- Removal of any foliage or parking that limits sight distance
- Double arrow warning sign at stem of T-intersections

INSTALL HIGH FRICTION SURFACE TREATMENT

EMPHASIS AREA(S):
Intersection, Speeding

SAFE SYSTEM APPROACH OBJECTIVE(S):
Safer Roads

EFFECTIVENESS:
52% reduction in wet road crashes at all severities[2]

Source: https://highways.dot.gov/safety/proven-safety-countermeasures/pavement-friction-management

DESCRIPTION:
Installation of high friction surface treatment involves materials with exceptional skid-resistant properties including aggregates that are both polish- and wear-resistant. This treatment develops channels to prevent water buildup on wet surfaces and creates an exceptionally durable surface capable of withstanding extreme roadway friction demands.

1 Oregon Department of Transportation. Crash Reduction Factor Manual (2023) countermeasure #RD5. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf

2 Oregon Department of Transportation. Crash Reduction Factor Manual (2023) countermeasure #RD4. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf

PROVIDE ACTUATED FLASHING BEACONS TRIGGERED BY APPROACHING VEHICLES AT UNSIGNALIZED INTERSECTIONS

EMPHASIS AREA(S):
Intersection

SAFE SYSTEM APPROACH OBJECTIVE(S): Safer Roads

EFFECTIVENESS:
27% reduction in all crashes at all severities[1]

Source: Google Maps Street View

DESCRIPTION:
Flashing beacons that only flash when a sensor detects a vehicle approaching an intersection. These systems provide enhanced safety warning information to approaching drivers, making them aware that vehicles are or may be entering the intersection.

INSTALL SPEED FEEDBACK SIGNS

EMPHASIS AREA(S):
Road and Lane Departure, Speeding

SAFE SYSTEM APPROACH OBJECTIVE(S): Safer Speeds

EFFECTIVENESS:
10% reduction in all crashes at all severities[2]

Source: https://highways.dot.gov/media/15211

DESCRIPTION:
Speed feedback signs provide real-time information to drivers about their speed and have been shown to lower driver speeds when paired with enforcement. They may be applied in locations with high frequency of speed-related crashes potentially related risky driving behaviors.

1 Oregon Department of Transportation. Crash Reduction Factor Manual (2023) countermeasure #I26. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf

2 Oregon Department of Transportation. Crash Reduction Factor Manual (2023) countermeasure #RD12. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf

PROVIDE A RAISED MEDIAN ON MULTILANE ROAD

EMPHASIS AREA(S):
Lane Departure, Intersection

SAFE SYSTEM APPROACH OBJECTIVE(S):
Safer Roads

Source: https://www.ardot.gov/wp-content/uploads/raised-medians-fact-sheet-v15.pdf

EFFECTIVENESS:
22% reduction in all crashes at all severities, not including property-damage only[1]

DESCRIPTION: Raised median is a concrete separator between opposing through lanes on a segment of a multilane roadway. It manages the frequency and magnitude of conflict points at driveways and intersections by altering access patterns.

PROVIDE A SAFETY EDGE

EMPHASIS AREA(S):
Road and Lane Departure

SAFE SYSTEM APPROACH OBJECTIVE(S):
Safer Roads

EFFECTIVENESS:
6% reduction in all crashes at all severities[2]

Source: https://highways.dot.gov/safety/proven-safety-countermeasures/safetyedgesm

DESCRIPTION:
Safety edge is a pavement edge sloped at an angle (30 to 35 degrees) to make it easier for a driver to safely re-enter the roadway after inadvertently driving onto the shoulder. It minimizes the edge change in pavement elevation by providing a more manageable recovery area for vehicles departing their travel lane.

1 Oregon Department of Transportation. Crash Reduction Factor Manual (2023) countermeasure #H38. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf

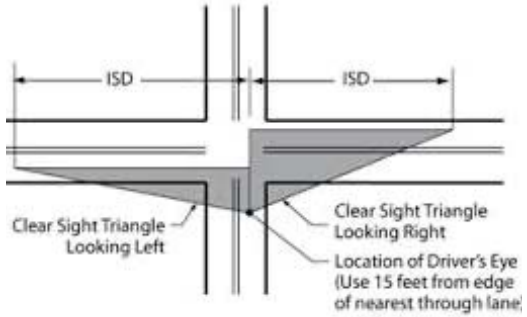
2 Oregon Department of Transportation. Crash Reduction Factor Manual (2023) countermeasure #RD5. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf

INCREASE TRIANGLE SIGHT DISTANCE

EMPHASIS AREA(S):
Intersection

SAFE SYSTEM APPROACH OBJECTIVE(S): Safer Roads

EFFECTIVENESS:
48% reduction in all crashes at all severities, not including property-damage only[1]



Source: https://highways.dot.gov/safety/local-rural/intersection-safety-manual-local-rural-road-owners/3-safety-analysis

DESCRIPTION: Increasing the sight distance at an intersection by removing obstructions within the triangle (e.g., vegetation, signs, buildings, parked vehicles) improves drivers ability to see approaching vehicles on the main line.

INSTALL WIDER EDGELINES

EMPHASIS AREA(S):
Road and Lane Departure

SAFE SYSTEM APPROACH OBJECTIVE(S):
Safer Roads

EFFECTIVENESS:
18% reduction in all crashes at all severities[2]

Source: https://highways.dot.gov/safety/proven-safety-countermeasures/wider-edge-lines

DESCRIPTION:
Wider edge lines increase drivers' perception of the edge of the travel lane.
Improves safety by keeping drivers in their designated travel lane and allowing more time for drivers to focus on critical driving tasks.

1 Oregon Department of Transportation. Crash Reduction Factor Manual (2023) countermeasure #I17. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf

2 Oregon Department of Transportation. Crash Reduction Factor Manual (2023) countermeasure #RD4. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf

INSTALL REQUIRED CHEVRON SIGNS ON RURAL HORIZONTAL CURVES

EMPHASIS AREA(S):
Road and Lane Departure

SAFE SYSTEM APPROACH OBJECTIVE(S): Safer Roads

EFFECTIVENESS:
16% reduction in all crashes at all severities[1]

Source: https://highways.dot.gov/safety/rwd/keep-vehicles-road/horizontal-curve/low-cost-treatments-horizontal-curve-safety-2016-4

DESCRIPTION:
Chevron signs show the shape and degree of curvature and help guide drivers through the curve or turn. This countermeasure applies to installing chevrons where the MUTCD requires their installation.

PROVIDE FLASHING BEACONS AT MINOR ROAD STOP-CONTROLLED INTERSECTIONS

EMPHASIS AREA(S):
Intersections

SAFE SYSTEM APPROACH OBJECTIVE(S): Safer Roads

EFFECTIVENESS:
13% reduction in all crashes at all severities[2]

Source: https://www.fhwa.dot.gov/publications/research/safety/08048/index.cfm

DESCRIPTION:
At minor road stop-controlled intersections, red flashing beacons installed on top of the stop signs on the minor controlled road. Flashing beacons provide a visible signal indicating the presence of an intersection.

1 Oregon Department of Transportation. Crash Reduction Factor Manual (2023) countermeasure #RD7. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf

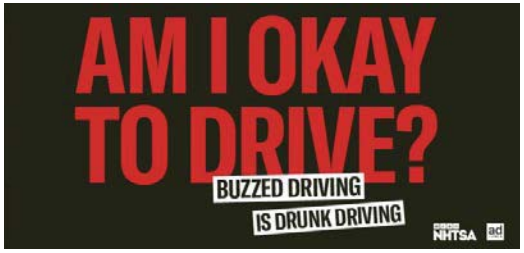
2 Oregon Department of Transportation. Crash Reduction Factor Manual (2023) countermeasure #I25. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf

PROMOTE EDUCATIONAL TRANSPORTATION SAFETY CAMPAIGNS

EMPHASIS AREA(S):
Speeding, Impairment, Risky Behaviors

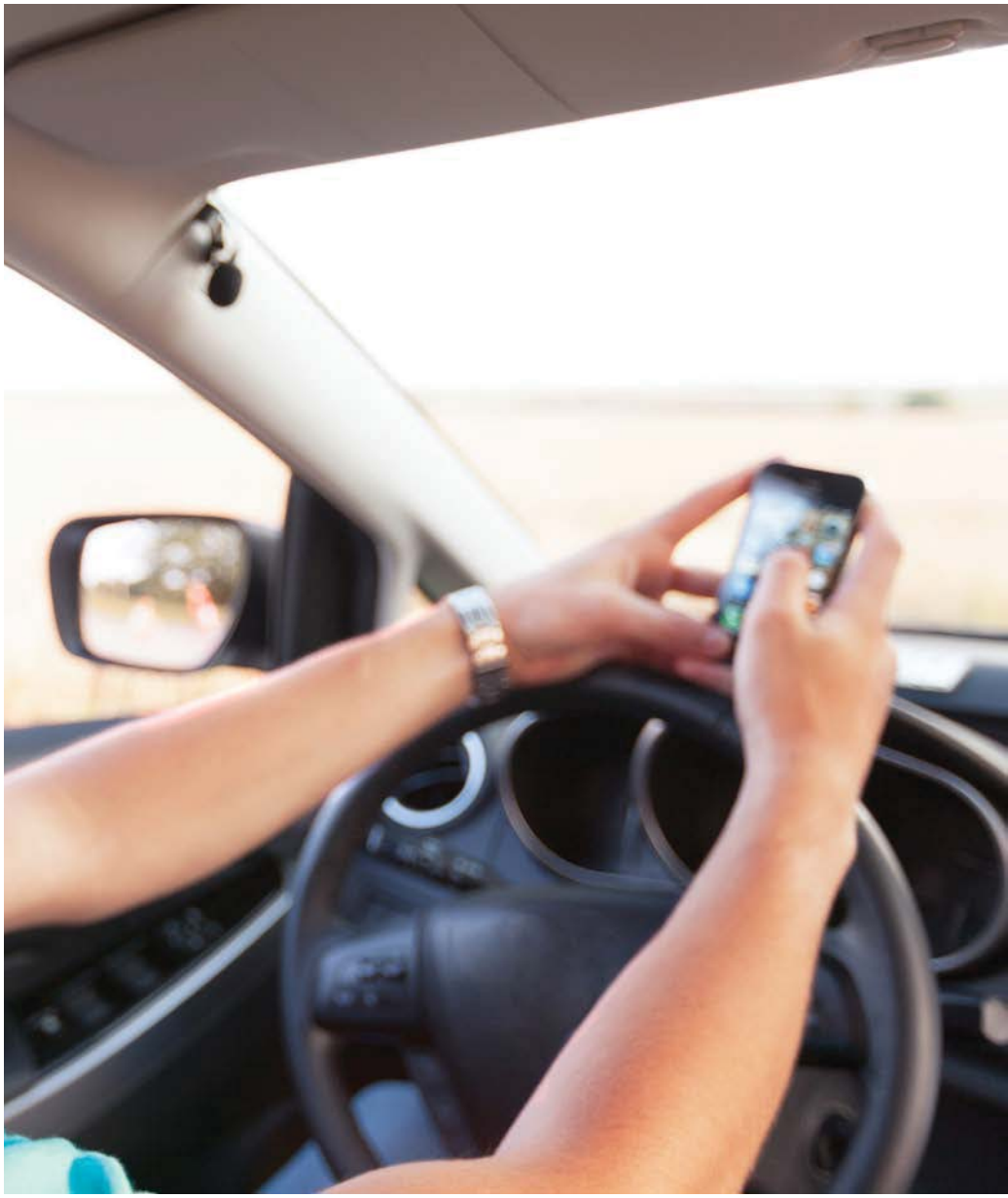
SAFE SYSTEM APPROACH OBJECTIVE(S): Safer People

EFFECTIVENESS:
Unproven/needs further evaluation



Source: https://www.nhtsa.gov/campaign/buzzed-driving

DESCRIPTION:
Promote transportation safety and increase awareness through educational campaigns aimed at addressing and reducing risky driving behaviors, speeding, driving while intoxicated, drowsy, or distracted, and aggressive driving. These campaigns may involve the media, printed materials, educational classes, or other community outreach events.



7 *Implementation and Monitoring*

The ultimate vision for Marion County is to have zero fatalities or life changing injuries on the transportation system. The following sections describe the long-term goals to achieve this vision and the methods to track the progress of the Plan.

TSAP Long-Term Goals

The Plan's long-term goals are as follows:

Embrace Safety Culture

Implement safety improvements consciously enhancing enforcement, outreach, and education across the County.

Improved Infrastructure

Prioritize infrastructure investments that enhance safety and guarantee comfort for VRUs.

Collaborate and Communicate

Take a coordinated approach across the County and its partners to work together on safety efforts and achieving the ultimate goal of zero traffic deaths and life-changing injuries.

Strategic Investments

Address traffic safety challenges holistically by evaluating crash data, considering public concerns and prioritizing strategies that will reduce traffic fatalities and serious injuries to zero.

Safety Performance Tracking

Performance measures shall be used to evaluate progress completing actions identified in the Plan, eliminating fatal and serious injury crashes on Marion County-owned roadways as well as evaluating the success of the County and its partners in implementing the Plan. These performance measures will be regularly monitored and tracked on the County's website.

- Number of fatal and serious injury crashes (total)
- Number of fatal and serious injury crashes (by crash type or emphasis area)
- Number of fatal and serious injury crashes (by mode)
- Proportion of fatal and serious injury crashes involving risky behaviors
- Number of safety projects installed at intersections
- Number of bicycle and pedestrian safety projects completed
- Number of curve warning signs installed/updated
- Number of outreach and education efforts to encourage safe road user behaviors
- Miles of rumble strips/high visibility pavement markings installed
- Miles of shoulder safety improvements
- Miles of safety edge installed

Marion County

Transportation Safety Action Plan

Appendix A: Toolbox of Safety Countermeasures For Rural Roadways

TOOLBOX OF SAFETY COUNTERMEASURES

								EMPHASIS AREAS							
COUNTERMEASURE NAME	SHORT DESCRIPTION	LONG DESCRIPTION (OR)	OR ID#	OR CRF	CONTEXT	LOCATION	SAFE SYSTEM ELEMENT	LANE/ROAD DEPARTURE	IMPAIRMENT	INTERSECTION	PEDESTRIANS	BIKES	SPEEDING	DISTRACTION	SCHOOLS
Remove/relocate fixed obstacles on roadside (from 3 feet to 16 feet)	Remove fixed objects within 16 feet of roadway.	Increasing the clear zone of a roadway by removing fixed objects within 16 feet of the roadway. A clear zone is an unobstructed, traversable roadside area that allows a driver to stop safely or regain control of a vehicle that has left the roadway. The provided CMF/CRF addresses all crash types, including PDOs.	RD1	0.22	Rural	Segment	Safer Roads	X							
Remove/relocate fixed obstacles on roadside (from 16 feet to 30 feet)	Remove fixed objects within 30 feet of roadway.	Increasing the clear zone of a roadway by removing fixed objects within 30 feet of the roadway. A clear zone is an unobstructed, traversable roadside area that allows a driver to stop safely or regain control of a vehicle that has left the roadway. The provided CMF/CRF addresses all crash types, including PDOs.	RD2	0.44	Rural	Segment	Safer Roads	X							
Flatten rural side slopes	Side slopes are flat areas adjacent to the travel way that are sloped to provide drainage. They can provide a safe recovery area for vehicles departing their lane.	Side slopes are flat areas adjacent to the travel way that are sloped to provide drainage. They can provide a safe recovery area for vehicles departing their lane. The flatter the slope, the more traversable the side slope becomes. The provided CMF/CRF addresses all crash types, including PDOs.	RD3	0.03, 0.15	Rural	Segment	Safer Roads	X					X		
Increase pavement friction	Install pavement surfacing systems with exceptional skid-resistant properties not typically provided by conventional materials.	Install pavement surfacing systems with exceptional skid-resistant properties not typically provided by conventional materials. It uses aggregates that are both polish- and wear- resistant and develop channels to prevent water buildup on wet surfaces creating an exceptionally durable surface capable of withstanding extreme roadway friction demands. This countermeasure addresses wet road crashes at all severities, including PDOs.	RD4	0.52	Both	Segment	Safer Roads	X					X		
Provide a safety edge	Safety edge is a pavement edge sloped at an angle (30-35 degrees) to make it easier for a driver to safely re enter the roadway after inadvertently driving onto the shoulder.	Safety edge is a pavement edge sloped at an angle (30-35 degrees) to make it easier for a driver to safely re enter the roadway after inadvertently driving onto the shoulder. It minimizes the edge change in pavement elevation by providing a more manageable recovery area for vehicles departing their travel lane. This countermeasure addresses all crashes at all severities, including PDOs.	RD5	0.06	Rural	Segment	Safer Roads	X							
Install recommended chevron signs on rural horizontal curves	The chevron alignment sign (W1-8) defines a change in horizontal alignment of a roadway. The signs show the shape and degree of curvature and help guide drivers through the curve or turn.	The chevron alignment sign (W1-8) defines a change in horizontal alignment of a roadway. The signs show the shape and degree of curvature and help guide drivers through the curve or turn. This countermeasure applies to installing chevrons where the MUTCD only RECOMMENDS their installation. Chevrons help delineate an upcoming curve, helping drivers to be aware of the presence of an approaching curve and help navigate their path. The provided CMF/CRF addresses all crash types, not including PDOs.	RD6	0.16	Rural	Segment	Safer Roads	X					X		
Install required chevron signs on rural horizontal curves curves	The chevron alignment sign (W1-8) defines a change in horizontal alignment of a roadway. The sign shows the shape and degree of curvature and help guide drivers through the curve or turn.	The chevron alignment sign (W1-8) defines a change in horizontal alignment of a roadway. The signs show the shape and degree of curvature and help guide drivers through the curve or turn. This countermeasure applies to installing chevrons where the MUTCD REQUIRES their installation. This countermeasure includes ballbanking to the 2009 MUTCD standard and replacing speed riders where appropriate. Chevrons help delineate an upcoming curve, helping drivers to be aware of the presence of an approaching curve and help navigate their path.The provided CMF/CRF addresses all crash types, not including PDOs.	RD7	0.16	Rural	Segment	Safer Roads	X							
Install oversized doubled-up and/or fluorescent yellow sheeting for advance curve warning signs	Install larger signing, retroreflective material, additional identical signs, and other conspicuous elements to increase visibility	Install larger signing, retroreflective material, additional identical signs, and other conspicuous elements to increase visibility. All of these signing enhancements can improve the effectiveness of curve warning and delineation signs by increasing the conspicuity, or prominent visibility, of the sign, especially during dark conditions. The provided CMF/CRF addresses all crash types, including PDOs.	RD8	0.20	Rural	Segment	Safer Roads	X							
Provide horizontal alignment and advisory speed sign for curves	Install advanced warning signs with horizontal alignment to alert drivers of a curve in the approach.	A combined turn (W1-1) sign or the curve (W1-2) sign with the advisory speed (W13-1) plaque to form a combination warning sign that is placed at the beginning of a turn or curve. Placed on roadways that have an unacceptable level of crashes on relatively sharp curves during periods of light and darkness. This countermeasure may also include horizontal alignment and/or advisory speed warning signs. Ideally this type of safety CM would be combined with other sign evaluations and upgrades (install warning signs, chevrons, delineators, markers, beacons, and relocation of existing signs per MUTCD standards.) The provided CMF/CRF addresses all crash types, not including PDOs.	RD9	0.13	Rural	Segment	Safer Roads	X					X		
Install advanced curve warning flashers with existing signs	A flashing beacon placed on the advanced horizontal alignment signs for a horizontal curve.	A flashing beacon placed on the advanced horizontal alignment signs for a horizontal curve. Using flashing beacons with a warning sign is another way to gain motorists' attention. The provided CMF/CRF addresses all crash types, including PDOs.	RD10	0.10	Rural	Segment	Safer Roads	X						X	

TOOLBOX OF SAFETY COUNTERMEASURES

								EMPHASIS AREAS							
COUNTERMEASURE NAME	SHORT DESCRIPTION	LONG DESCRIPTION (OR)	OR ID#	OR CRF	CONTEXT	LOCATION	SAFE SYSTEM ELEMENT	LANE/ROAD DEPARTURE	IMPAIRMENT	INTERSECTION	PEDESTRIANS	BIKES	SPEEDING	DISTRACTION	SCHOOLS
Install dynamic speed feedback signs for curves	Supplemental beacons and/or messages that activate when a motorist approaches the curve at a high speed.	Supplemental beacons and/or messages that activate when a motorist approaches the curve at a high speed. It measures the speeds of approaching vehicles and provides messages to speeding drivers to slow down to an advisory speed. The advantage of this treatment is that the device has a much greater effect on high speed vehicles than a static curve warning sign. This countermeasure addresses all crashes at all severities, including PDOs.	RD11	0.05	Rural	Segment	Safer Roads	X					X		
Install speed feedback signs	Speed feedback signs provide drivers with real-time information about their speed as they pass the sign.	Speed feedback signs provide drivers with real-time information about their speed as they pass the sign. When paired with enforcement, it helps manage driving speeds and reduces the probability of speed related crashes. he provided CMF/CRF addresses all crash types, including PDOs.	RD12	0.10	Both	Segment	Safer Roads	X					X		
Install raised or recessed pavement markers	Delineators placed on the roadway adjacent to the longitudinal pavement markings of a road. They are used to supplement the delineation provided by existing pavement markings.	Delineators placed on the roadway adjacent to the longitudinal pavement markings of a road. They are used to supplement the delineation provided by existing pavement markings. By installing raised or recessed pavement markers, the pavement markings are more prominent in adverse weather conditions, helping a driver to safely navigate the path of the roadway. This countermeasure addresses nighttime crashes at all severities, including PDOs.	RD13	0.15	Both	Segment	Safer Roads	X							
Install post-mounted delineators on curves	A flexible fiber or aluminum post retroreflective device mounted above the roadway surface and along the side of the roadway in a series to show roadway alignment.	A flexible fiber or aluminum post retroreflective device mounted above the roadway surface and along the side of the roadway in a series to show roadway alignment. Retroreflective material, such as post-mounted delineators, can be a highly effective treatment for delineating curves, especially at nighttime. They improve driver lane position both at the entry to the curve and at its midpoint. The provided CMF/CRF addresses all crash types with an emphasis on head-on nighttime curve crashes , including PDOs.	RD14	0.30	Rural	Segment	Safer Roads	X							
Install rural edge line striping and/or centerline striping	Edge line markings separate the travel lane from the shoulder. A standard edge line marking is 4 inches wide	Edge line markings separate the travel lane from the shoulder. A standard edge line marking is 4 inches wide. Edge lines communicate the intended roadway alignment and travel path to the driver. This can be especially beneficial during nighttime or adverse weather conditions.The provided CMF/CRF addresses all crash types with an emphasis on head-on, including PDOs.	RD15	0.11	Rural	Segment	Safer Roads	X							
Install centerline rumble strips	Rumble strips are ground/milled in patterns on the roadway that provide both an audible warning (rumbling sound) and a physical vibration to drivers.	Rumble strips are ground/milled in patterns on the roadway that provide both an audible warning (rumbling sound) and a physical vibration to drivers. Rumble strip alerts drivers that they are leaving their travel lane, allowing them time to make a safe recovery back into their lane. ODOT lists two CRFs for this countermeasure, one that addresses run-off road crashes at all severities, including PDOs, and another that addresses head-on and sideswiped crashes at all injury severities, not including PDOs.	RD16, RD17	0.23, 0.45	Rural	Segment	Safer Roads	X							
Install shoulder rumble strips	Rumble strips are ground/milled in patterns on the roadway that provide both an audible warning (rumbling sound) and a physical vibration to drivers.	Rumble strips are ground/milled in patterns on the roadway that provide both an audible warning (rumbling sound) and a physical vibration to drivers. The audible warning and physical vibration inside the car alerts drivers that they are leaving their travel lane, allowing them time to make a safe recovery back into their lane. This countermeasure addresses run-off road crashes at all severities, including PDOs.	RD18	0.22	Rural	Segment	Safer Roads	X							
Install profiled lined pavement markings	A type of pavement marking consisting of a base stripe with raised shapes located at regular and predetermined intervals.	A type of pavement marking consisting of a base stripe with raised shapes located at regular and predetermined intervals. Profiled line pavement markings produces a rumble effect and enhances the visibility of the pavement markings. In addition, they rove visibility during wet or rainy conditions. This countermeasure addresses night and wet-road crashes at all severities, including PDOs.	RD19	0.09	Rural	Segment	Safer Roads	X							
Widen paved shoulder by 1 foot	Increasing the width of the paved surface adjacent to or outside of the travel lanes by one (1) foot.	Increasing the width of the paved surface adjacent to or outside of the travel lanes by one (1) foot. Provides a larger recovery area for errant drivers leaving their travel lane. The provided CMF/CRF addresses all crash types with an emphasis on head-on, including PDOs.	RD20	0.06	Both	Segment	Safer Roads	X							
Widen paved shoulder by 2 feet	Increasing the width of the paved surface adjacent to or outside of the travel lanes by two (2) feet.	Increasing the width of the paved surface adjacent to or outside of the travel lanes by two (2) feet. Provides a larger recovery area for errant drivers leaving their travel lane. The provided CMF/CRF addresses all crash types with an emphasis on head-on, including PDOs.	RD21	0.13	Both	Segment	Safer Roads	X							
Widen paved shoulder by 3 feet	Increasing the width of the paved surface adjacent to or outside of the travel lanes by 3 (3) feet.	Increasing the width of the paved surface adjacent to or outside of the travel lanes by three (3) feet. Provides a larger recovery area for errant drivers leaving their travel lane.The provided CMF/CRF addresses all crash types with an emphasis on head-on, including PDOs.	RD22	0.18	Both	Segment	Safer Roads	X							

TOOLBOX OF SAFETY COUNTERMEASURES

								EMPHASIS AREAS							
COUNTERMEASURE NAME	SHORT DESCRIPTION	LONG DESCRIPTION (OR)	OR ID#	OR CRF	CONTEXT	LOCATION	SAFE SYSTEM ELEMENT	LANE/ROAD DEPARTURE	IMPAIRMENT	INTERSECTION	PEDESTRIANS	BIKES	SPEEDING	DISTRACTION	SCHOOLS
Upgrade existing markings to reflective pavement markings	Applied on existing roadway surface edge lines as a paint, tape, or a thermoplastic material. Wet-reflective elements allow a pavement marking to retain its retroreflectivity when covered by water.	Applied on existing roadway surface edge lines as a paint, tape, or a thermoplastic material. Wet-reflective elements allow a pavement marking to retain its retroreflectivity when covered by water. Wet-reflective pavement markings increase the retroreflectivity of the edge line markings on roads, which improves visibility and helps guide motorists safely along the roadway path. This countermeasure addresses wet-road crashes at all severities, including PDOs.	RD23	0.28	Rural	Segment	Safer Roads	X							
Install wider edgelines (4 inches to 6 inches)	Widen edge lines from 4 inches to 6 inches.	Widen edge lines from 4 inches to 6 inches. Increasing the width of roadways increases visibility for drivers. Improves safety by keeping drivers in their designated travel lane and allowing more time for drivers to focus on critical driving tasks. The provided CMF/CRF addresses all crash types with an emphasis on head-on, including PDOs.	RD24	0.18	Rural	Segment	Safer Roads	X							
Install median barrier	Median barriers are longitudinal barriers most commonly used to separate opposing directions of traffic on a divided highway.	Median barriers are longitudinal barriers most commonly used to separate opposing directions of traffic on a divided highway. While these systems may not reduce the frequency of crashes due to roadway departure, they do help prevent a median crash from becoming a median crossover head-on collision which has a high chance of resulting in a fatality or severe injury. This countermeasure addresses all crashes at all injury severities, not including PDOs.	RD25	0.30	Both	Segment	Safer Roads	X							
Install new guard rail	A semi-rigid barrier typically consisting of connected segments of metal railing supported by posts and blocks.	A semi-rigid barrier typically consisting of connected segments of metal railing supported by posts and blocks. Because guardrail systems are designed to absorb energy during a crash, and the entire assembly is designed to move or deflect during an impact, guardrail systems usually minimize potential injuries in run-off-road or roadway departure crashes. This countermeasure addresses run-off-road crashes at all severities, not including PDOs.	RD26	0.47	Both	Segment	Safer Roads	X							
Install seasonal wildlife warning signs	Seasonal wildlife warning signs that are only present during certain times of the year when wildlife cross roadway systems most frequently	Seasonal wildlife warning signs that are only present during certain times of the year when wildlife cross roadway systems most frequently. Seasonal wildlife warning signs improves the safety of roadways by alerting drivers to areas where wildlife could be present to help reduce crashes with vehicles. The provided CMF/CRF addresses all crash types, including PDOs.	RD27	0.26	Rural	Segment	Safer Roads	X							
Install wildlife detection system	Wildlife detection systems that utilize sensors to detect large animals.	Wildlife detection systems that utilize sensors to detect large animals. Wildlife detection systems, when placed in appropriate locations, can reduce collisions between wildlife and vehicles by informing drivers when wildlife is present. The provided CMF/CRF addresses all crash types including PDOs.	RD28	0.87	Rural	Both	Safer Roads	X							
Install glare reduction	Headlight glare can cause disruption to vision, debilitating a driver and making the driving task less safe, potentially leading to crashes.	Headlight glare can cause disruption to vision, debilitating a driver and making the driving task less safe, potentially leading to crashes. Glare reductions are used to alleviate glare caused by the headlights of traffic in opposing lanes and may be mounted on guardrails or concrete median barriers. This countermeasure addresses nighttime crashes only crashes at all severities, including PDOs.	RD29	0.15	Both	Segment	Safer Roads								
Install lighting at intersection	A permanent source of artificial lighting installed at an intersection that provides greater visibility of the intersection.	A permanent source of artificial lighting installed at an intersection that provides greater visibility of the intersection. Intersection lighting allows for greater visibility of the intersection, helping drivers determine a safe path through the intersection. This can be especially helpful at rural intersections where the only source of lighting for the roadway is often provided by vehicle headlights. This countermeasure can reduce night crashes at all injury severities, not including PDOs.	I1	0.38	Both	Intersection	Safer Roads			X					
Increase signal head quantity at an intersection	An additional primary head placed on a traffic signal mast arm.	An additional primary head placed on a traffic signal mast arm. Installing an additional signal head improves the visibility of the signal. Treatments that improve signal visibility help drivers make decisions at the intersection and alert them to the presence of a signalized intersection. The provided CMF/CRF addresses all crash types, including PDOs.	I5	0.28	Urban	Intersection	Safer Roads			X					
Install flashing beacons as advance warning for intersections	A flashing beacon installed on a signal ahead or intersection ahead warning sign. This feature flashes at all times.	A flashing beacon installed on a signal ahead or intersection ahead warning sign. This feature flashes at all times. It helps bring more awareness to drivers of an upcoming intersection where it might not be expected. The provided CMF/CRF addresses all crash types, including PDOs.	I15	0.13	Urban	Segment	Safer Roads			X					
Install actuated or coordinated flashing beacons as advance warning for signalized intersections	A flashing beacon on an advance warning sign for a signalized intersection that activates at a predetermined time before the end of the green interval.	A flashing beacon on an advanced warning sign for a signalized intersection that activates at a predetermined time before the end of the green interval. It notifies drivers that the green interval is about to end to help reduce indecision and volatility in driver behavior during the yellow interval. This countermeasure addresses rear-end crashes at all severities, including PDOs.	I16	0.10	Urban	Segment	Safer Roads			X					
Increase triangle sight distance	Removal of sight distance restrictions (vegetation, parked vehicles, signs, buildings) from the sight triangles at an intersection.	Remove sight distance restrictions (e.g., vegetation, parked vehicles, signs, buildings) from the sight triangles at an intersection. Improves drivers ability to see approaching vehicles on the main line without obstruction. The provided CMF/CRF addresses all crash types, not including PDOs.	I17	0.48	Both	Intersection	Safer Roads			X					

TOOLBOX OF SAFETY COUNTERMEASURES

								EMPHASIS AREAS							
COUNTERMEASURE NAME	SHORT DESCRIPTION	LONG DESCRIPTION (OR)	OR ID#	OR CRF	CONTEXT	LOCATION	SAFE SYSTEM ELEMENT	LANE/ROAD DEPARTURE	IMPAIRMENT	INTERSECTION	PEDESTRIANS	BIKES	SPEEDING	DISTRACTION	SCHOOLS
Increase pavement friction	Pavement surfacing systems with exceptional skid-resistant properties not typically provided by conventional materials	Pavement surfacing systems with exceptional skid-resistant properties not typically provided by conventional materials. It is used in locations where frequent crashes are observed for which insufficient friction is a contributing factor. The provided CMF/CRF addresses all crash types, including PDOs.	I18	0.52	Both	Both	Safer Roads	X		X					
Improve intersection warning	A list of proven low-cost countermeasures that can be implemented at unsignalized intersections.	A list of proven low-cost countermeasures that can be implemented at unsignalized intersections, listed: • Double up (left and right), oversize advance intersection warning signs, with street name sign plaques on the through approach • Doubled up (left and right), oversize advance "Stop Ahead" signs • Doubled up, oversize STOP signs •Minimum 6-foot wide raised splitter island on stop approach (without pavement widening) •Properly placed stop bar •Removal of any foliage or parking that limits sight distance •Double arrow warning sign at stem of T-intersections The CRF value is dependent on the number of countermeasures implemented (1-2, 3-4, 5-7) at the intersection. This countermeasure can reduce all crashes at all severities, including PDOs.	I21	0.20, 0.25, 0.30	Both	Intersection	Safer Roads			X					
Increase retroreflectivity of stop signs	A material applied to a stop sign that reflects a large portion of light directly back to the source.	A material applied to a stop sign that reflects a large portion of light directly back to the source. Increasing the retroreflectivity increases visibility and conspicuity of the stop sign and reduces the frequency of crashes related to driver unawareness. The provided CMF/CRF addresses all crash types, including PDOs.	I23	0.07	Both	Intersection	Safer Roads								
Install Flashing beacons at all-way stop-controlled intersections	Red flashing beacons placed on top of the stop signals at an all-way stop controlled intersection.	Red flashing beacons placed on top of the stop signs at an all-way stop controlled intersection. Flashing beacons provide a visible signal indicating the presence of an intersection and can be very effective in rural areas where there may be long stretches between intersections. The provided CMF/CRF addresses all crash types, including PDOs.	I24	0.28	Both	Intersection	Safer Roads			X					
Provide flashing beacons at minor-road stop-controlled intersections	At minor road stop controlled intersections, red flashing beacons installed on top of the stop signs on the minor controlled road.	At minor road stop controlled intersections, red flashing beacons installed on top of the stop signs on the minor controlled road. Flashing beacons provide a visible signal indicating the presence of an intersection. The provided CMF/CRF addresses all crash types, including PDOs.	I25	0.13	Both	Intersection	Safer Roads			X					
Provide actuated flashing beacons triggered by approaching vehicles at unsignalized intersections	Flashing beacons that only flash when a sensor detects a vehicle approaching an intersection.	Flashing beacons that only flash when a sensor detects a vehicle approaching an intersection. These systems provide enhanced safety warning information for approaching drivers, making them aware that vehicles are or may be entering the intersection. The provided CMF/CRF addresses all crash types, including PDOs.	I26	0.27	Both	Intersection	Safer Roads			X					
Install transverse rumble strips on stop-controlled approach(es)	Rumble strips placed across the roadway to provide audible warning (rumbling sound) to alert drivers of an upcoming intersection.	Rumble strips placed across the roadway to provide audible warning (rumbling sound) to alert drivers of an upcoming intersection. Transverse rumble strips have been proven to be effective at reducing the number of vehicles disregarding a stop sign. The provided CMF/CRF addresses all crash types, A-injury and B-injury severities.	I27	0.25	Both	Intersection	Safer Roads			X					
Install 6-foot or greater raised divider on stop approach (splitter island)	A channelizing island that separates traffic in opposing directions of travel at a stop approach of an unsignalized intersection and contains a left side, supplemental stop sign.	A channelizing island that separates traffic in opposing directions of travel at a stop approach of an unsignalized intersection and contains a left side, supplemental stop sign. The installation of splitter islands allows for the addition of a stop sign in the median to make the intersection more conspicuous. The provided CMF/CRF addresses all crash types, including PDOs.	I28	0.15	Both	Intersection	Safer Roads			X					
Provide "STOP AHEAD" pavement markings	Pavement markings on a roadway surface that informs drivers of an approaching unsignalized intersection	Pavement markings on a roadway surface that informs drivers of an approaching unsignalized intersection. These pavement markings can be used to increase drivers' alertness to the presence of an unsignalized intersection. The provided CMF/CRF addresses all crash types and all severities, including PDOs.	I30	0.31	Both	Segment	Safer Roads			X					
Median U-turn intersection treatment to reduce left-turn conflicts	Modifies direct left turns from the major approaches.	Modifies direct left turns from the major approaches. Vehicles proceed through the main intersection, make a U-turn a short distance downstream, followed by a right turn at the main intersection. The provided CMF/CRF addresses all crash types, not including PDOs.	H1	0.30	Both	Intersection	Safer Roads			X					
Install right-turn lane on single major road approach at 3- or 4-leg unsignalized intersection	A right-turn auxiliary lane for storage and to accommodate decreasing speeds for right-turn vehicles as they approach an intersection.	A right-turn auxiliary lane for storage and to accommodate decreasing speeds for right-turn vehicles as they approach an intersection. Providing this can reduce rear-end crashes by allowing vehicles to proceed through the intersection without having to stop or slow down. The provided CMF/CRF addresses all crash types including PDOs.	H2	0.14	Both	Intersection	Safer Roads			X					
Install right-turn lane on both major road approaches at 3- or 4-leg unsignalized intersection	A right-turn auxiliary lane for storage and to accommodate decreasing speeds for right-turn vehicles as they approach an intersection.	A right-turn auxiliary lane for storage and to accommodate decreasing speeds for right-turn vehicles as they approach an intersection. Providing this can reduce rear-end crashes by allowing vehicles to proceed through the intersection without having to stop or slow down. The provided CMF/CRF addresses all crash types including PDOs.	H3	0.26	Both	Intersection	Safer Roads			X					

TOOLBOX OF SAFETY COUNTERMEASURES

								EMPHASIS AREAS							
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Channelized right-turn lane with raised median	A right-turn lane separated from the through and left-turn lanes on the approach by a raised island and has separate traffic control from the primary intersection.	A right-turn lane separated from the through and left-turn lanes on the approach by a raised island and has separate traffic control from the primary intersection. The channelized right-turn lane may or may not have a deceleration lane entering it and it may have a merge or an auxiliary lane at the existing end. Improves clarity for the minor street traffic, allowing them to identify vehicles in the through lanes on the major street and reduces the number of conflict points within an intersection. The provided CMF/CRF addresses all crash types, not including PDOs.	H6	0.35	Both	Intersection	Safer Roads			X					
left turn lane on single major road approach at rural 3-leg unsignalized intersection	Adds a left-turn auxiliary lane on the major approach for storage and to accommodate the deceleration of left-turn vehicles.	Adds a left-turn auxiliary lane on the major approach for storage and to accommodate the deceleration of left-turn vehicles. These lanes allow vehicles to proceed through the intersection without needing to stop or slow down for vehicles waiting to make a left turn. The provided CMF/CRF addresses all crash types, including PDOs.	H9	0.44	Rural	Intersection	Safer Roads			X					
Left turn lane on both major road approaches at rural 3-leg unsignalized intersection	Adds a left-turn auxiliary lane on both approaches for storage and to accommodate the deceleration of left-turn vehicles.	Adds a left-turn auxiliary lane on both approaches for storage and to accommodate the deceleration of left-turn vehicles. These lanes allow vehicles to proceed through the intersection without needing to stop or slow down for vehicles waiting to make a left turn. The provided CMF/CRF addresses all crash types, including PDOs.	H10	0.48	Rural	Intersection	Safer Roads			X					
Left-turn lane on single major road approach at rural 3-leg signalized intersection	Adds a left-turn auxiliary lane on the major approach for storage and to accommodate the deceleration of left-turn vehicles.	Adds a left-turn auxiliary lane on the major approach for storage and to accommodate the deceleration of left-turn vehicles. These lanes allow vehicles to proceed through the intersection without needing to stop or slow down for vehicles waiting to make a left turn. The provided CMF/CRF addresses all crash types, including PDOs.	H14	0.15	Rural	Intersection	Safer Roads			X					
Left turn lane on single major road approach at rural 4-leg signalized intersection	Adds a left-turn auxiliary lane on the major approach for storage and to accommodate the deceleration of left-turn vehicles.	Adds a left-turn auxiliary lane on the major approach for storage and to accommodate the deceleration of left-turn vehicles. These lanes allow vehicles to proceed through the intersection without needing to stop or slow down for vehicles waiting to make a left turn.The provided CMF/CRF addresses all crash types, including PDOs.	H15	0.18	Rural	Intersection	Safer Roads			X					
Left turn lane on both major road approaches at rural 4-leg signalized intersection	Adds a left-turn auxiliary lane on both approaches for storage and to accommodate the deceleration of left-turn vehicles.	Adds a left-turn auxiliary lane on both approaches for storage and to accommodate the deceleration of left-turn vehicles. These lanes allow vehicles to proceed through the intersection without needing to stop or slow down for vehicles waiting to make a left turn.The provided CMF/CRF addresses all crash types, including PDOs.	H16	0.33	Rural	Intersection	Safer Roads			X					
Channelized left-turn lane at 3- or 4-leg intersection with raise median on all approaches	Provides a median separation between the designated left turn lane and opposing through lanes at an intersection.	Provides a median separation between the designated left turn lane and opposing through lanes at an intersection. Channelized left-turn lanes provide the left turning motorist a line of sight to opposing through vehicles, allowing them to see oncoming traffic. Channelized, not including PDOs.	H17	0.27	Both	Intersection	Safer Roads			X					
Convert minor road stop controlled intersection into roundabout	Converts an unsignalized, stop controlled intersection into a roundabout. Roundabouts eliminate up to 75% of vehicle conflict points typically associated with traditional intersections.	Converts an unsignalized, stop controlled intersection into a roundabout. Roundabouts eliminate up to 75% of vehicle conflict points typically associated with traditional intersections. They also enhance safety by reducing vehicle speeds both in and through the intersection and by changing the crash type from angle to sideswipe, which typically results in less severe crashes. The provided CMF/CRF addresses all crash types with an emphasis on left-turn, not including PDOs.	H18	0.82	Both	Intersection	Safer Roads			X					
Convert signalized intersection into roundabout	Converts a signalized intersection into a roundabout. Roundabouts eliminate up to 75% of vehicle conflict points typically associated with traditional intersections.	Converts a signalized intersection into a roundabout. Roundabouts eliminate up to 75% of vehicle conflict points typically associated with traditional intersections. They also enhance safety by reducing vehicle speeds both in and through the intersection and by changing the crash type from angle to sideswipe, which typically results in less severe crashes. Roundabouts have the chance to significantly reduces all crash types at all severities but not include PDOs.	H19	0.78	Both	Intersection	Safer Roads			X					
Convert rural 2 way or yield control to all-way stop control	Modifies an intersection with minor road stop or yield control to an intersection that is stop controlled for all approaches.	Modifies an intersection with minor road stop or yield control to an intersection that is stop controlled for all approaches. All-way stop control can reduce right-angle and turning collisions at unsignalized intersections by providing more orderly movement at an intersection, reducing through and turning speeds, and minimizing the safety impacts of any sight distance restrictions that may be present. The provided CMF/CRF addresses all crash types with an emphasis on left-turn, including PDOs.	H21	0.48	Rural	Intersection	Safer Roads			X					
Convert 4-leg intersection to two 3-leg intersections when minor road ADT is 15 - 30% of total entering volume	realigns an approach to a 4-leg intersection elsewhere to create two 3-leg intersections. Minor road must meet ADT requirements	Realign an approach to a 4-leg intersection elsewhere to create two 3-leg intersections. This countermeasure is specifically for intersections with the minor street average daily traffic (ADT) being 15%-30% of total entering traffic. Only applicable to unsignalized intersections. The provided CMF/CRF addresses all crash types with an emphasis on left-turn, not including PDOs.	H26	0.25	Both	Intersection	Safer Roads			X					

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Convert 4-leg intersection to two 3-leg intersections when minor road ADT is more than 30% of total entering volume	Realign an approach to a 4-leg intersection elsewhere to create two 3-leg intersections. Minor road must meet ADT requirements	Realign an approach to a 4-leg intersection elsewhere to create two 3-leg intersections. This countermeasure is specifically for intersections with the minor street average daily traffic (ADT) being more than 30% of total entering traffic. Only applicable to unsignalized intersections. The provided CMF/CRF addresses all crash types with an emphasis on left-turn, not including PDOs.	H27	0.33	Both	Intersection	Safer Roads			X					
Install rural median acceleration lane	a left-turn auxiliary or speed change lane that allows vehicles to accelerate to highway speeds.	a left-turn auxiliary or speed change lane that allows vehicles to accelerate to highway speeds. Drivers turning onto a roadway accelerate until the desire highway speed is reached. When acceleration by entering traffic takes place directly on the traveled way, it may disrupt the flow of through traffic and create potential conflicts. The provided CMF/CRF addresses all crash types with an emphasis on left-turn, not including PDOs.	H28	0.45	Rural	Intersection	Safer Roads			X					
Install Intersection Lighting	Provide lighting at an intersection	A permanent source of artificial light installed at an intersection that provides greater visibility of the intersection. This countermeasure reduces night time crashes at all injury severities, not including PDOs.	H29	0.38	Both	Intersection	Safer Roads			X	X	X			
Install lighting on a roadway segment	A permanent source of artificial lighting installed at a segment of roadway that provides greater visibility.	A permanent source of artificial lighting installed at a segment of roadway that provides greater visibility. Segment lighting allows for greater visibility of the roadway and the visual cues that help drivers determine a safe path along a roadway. The provided CMF/CRF addresses all crash types with an emphasis on left-turn, not including fatal and PDOs.	H30	0.28	Both	Segment	Safer Roads				X	X			
Install any type of median barrier	Longitudinal barriers that separate opposing directions of traffic on a divided highway.	Longitudinal barriers that separate opposing directions of traffic on a divided highway. These help in preventing a median crash from becoming a median crossover head-on collision which has a high chance of resulting in a fatality of severe injury. The provided CMF/CRF addresses all crash types with an emphasis on left-turn, not including PDOs.	H31	0.30	Both	Segment	Safer Roads	X							
Install new guard rail	A semi-rigid barrier typically consisting of connected segments of metal railing supported by posts and blocks.	A semi-rigid barrier typically consisting of connected segments of metal railing supported by posts and blocks. Because guardrail systems are designed to absorb energy during a crash, and the entire assembly is designed to move or deflect during an impact, guardrail systems usually minimize potential injuries in run-off-road or roadway departure crashes. The provided CMF/CRF addresses all crash types with an emphasis on left-turn, not including PDOs.	H32	0.47	Both	Segment	Safer Roads	X							
Install two-way left-turn lane on 2-lane road	A type of traversable median reserved for the exclusive use of vehicles turning left from both directions.	A type of traversable median reserved for the exclusive use of vehicles turning left from both directions. Reduces the need for vehicles to slow down for vehicles waiting to turn left by separating the left-turning vehicles from the through lanes. In areas with frequent accesses, this countermeasure could significantly reduce these potential conflicts along an entire corridor in addition to increasing capacity of the facility. This countermeasure addresses rear-end crashes at all severities, including PDOs.	H33	0.39	Both	Segment	Safer Roads			X					
Provide a raised median on approaches	A concrete median separation between opposing through lanes on a segment of roadway.	A concrete median separation between opposing through lanes on a segment of roadway. Manages the frequency and magnitude of conflict points at driveways and intersections by altering access patterns. The provided CMF/CRF addresses all crash types.	H37	0.39	Urban	Segment	Safer Roads			X					
Provide a raised median on multilane road	A concrete median separation between opposing through lanes on a segment of a multilane roadway.	A concrete median separation between opposing through lanes on a segment of a multilane roadway. Manages the frequency and magnitude of conflict points at driveways and intersections by altering access patterns. The provided CMF/CRF addresses all crash types, not including PDOs.	H38	0.22	Urban	Segment	Safer Roads			X					
Provide a raised median on rural multilane road	A concrete median separation between opposing through lanes on a segment of a multilane roadway.	A concrete median separation between opposing through lanes on a segment of a multilane roadway. Manages the frequency and magnitude of conflict points at driveways and intersections by altering access patterns. The provided CMF/CRF addresses all crash types, not including PDOs.	H39	0.12	Rural	Segment	Safer Roads			X					
Install traversable median by four feet or more	Traversable medians provide separation between opposing flows of traffic.	Traversable medians provide separation between opposing flows of traffic and where wide enough, are striped to prohibit its use as a two-way left-turn late. Traversable medians are delineated by pavement markings only. The provided CMF/CRF addresses all crash types, not including PDOs.	H40	0.12	Both	Segment	Safer Roads			X					
Install passing lane on rural 2-lane roadway	An auxiliary lane provided in a short segment to allow passing.	An auxiliary lane provided in a short segment to allow passing. Providing passing opportunities with a climbing lane reduces the probability of increasing passing maneuvers that could lead to various lane departure crashes. This countermeasure addresses all crashes at all injury severities, not including PDOs.	H41	0.25	Rural	Segment	Safer Roads	X							
Widen rural paved lane width by one foot	Increase the paved width of the travel lanes.	Increase the paved width of the travel lanes. Provides more recovery area for errant vehicles drifting in their lane. The provided CMF/CRF addresses all crash types, including PDOs.	H42	0.05	Rural	Segment	Safer Roads	X							

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Improve horizontal curve (increase radius)	Increase the radius of the horizontal curvature of the roadway.	Increase the radius of the horizontal curvature of the roadway. An increased raii means an increase in sight distance, providing a more complete visual to drivers of the upcoming alignment of the roadway. It also decreases the speed differential between the approach tangent and the horizontal curve. CRF value is dependent on the original degree of the curve and the new degree of the curve. The provided CMF/CRF addresses all crash types, including PDOs.	H43	0.15 - 0.78	Both	Segment	Safer Roads	X							
Flatten crest vertical curve	Reduce the curvature of the roadway by flattening the crest curve or reducing the grade of a sage curve.	Reduce the curvature of the roadway by flattening the crest curve or reducing the grade of a sage curve. Provides more complete visual to drivers of the upcoming alignment of the roadway and subsequently more stopping sight distance. The provided CMF/CRF addresses all crash types, including PDOs.	H44	0.51	Both	Segment	Safer Roads						X		
Improve super elevation variance on rural curves (between 0.01 and 0.02)	Improve the rotation of the pavement on the approach and through a horizontal curve.	Improve the rotation of the pavement on the approach and through a horizontal curve. Expressed as a decimal representing the ratio of the pavement slope to width. It is intended to assist the driver in negotiating the curve by counteracting the lateral acceleration produced by tracking. The CRF value is dependent on a formula given by ODOT (CRF = -6x(SV-0.01)). The provided CMF/CRF addresses all crash types.	H45	Formula	Rural	Segment	Safer Roads	X							
Improve super elevation variance on rural curves (more than 0.02)	Improve the rotation of the pavement on the approach and through a horizontal curve.	Improve the rotation of the pavement on the approach and through a horizontal curve. Expressed as a decimal representing the ratio of the pavement slope to width. It is intended to assist the driver in negotiating the curve by counteracting the lateral acceleration produced by tracking. The CRF value is dependent on a formula given by ODOT (CRF = -6x(SV-0.01)). This countermeasure addresses all crashes at all severities.	H46	Formula	Rural	Segment	Safer Roads	X							
Increase pavement friction on curve segment by installing High Friction Surface Treatment	Install materials that provide exceptional skid-resistant properties not typically provided by conventional materials.	Applied at locations where frequent crashes are observed for which insufficient friction is a contributing factor. Generally in areas where frequent braking occurs, such as curves. Prevents water build up on wet surfaces and provides exceptional roadway friction demands. The provided CMF/CRF addresses all crash types, including PDOs.	H48	0.52	Both	Segment	Safer Roads	X							
Install variable speed limit signs in rural roadway	Speed limits that change based on road, traffic, and/or weather conditions.	Speed limits that change based on road, traffic, and/or weather conditions. Increases the safety by reducing the probability of a crash associated with traveling at speeds higher than what is appropriate for conditions. The provided CMF/CRF addresses all crash types, including PDOs.	H52	0.20	Rural	Segment	Safer Roads						X		
Install truck escape ramp	An emergency area located adjacent to a downgrade roadway to provide a location for out-of-control vehicles.	An emergency area located adjacent to a downgrade roadway to provide a location for out-of-control vehicles to slow and stop away from other vehicles on the road. Escape ramps enable vehicles that are having braking issues to safely stop. This countermeasure addresses truck crashes at all injury severities, including PDOs.	H54	0.20	Both	Segment	Safer Roads						X		
Install guide signs	Guide signs provide directional and mileage information to specific destinations.	Guide signs provide directional and mileage information to specific destinations. Types of roadways guide signs include: •Interstate, US rout, state, and county markers •National forest route markers •Emergency evacuation route signs •Exit signs The provided CMF/CRF addresses all crash types, including PDOs.	H55	0.15	Both	Both	Safer Roads							X	
Provide an auxiliary lane between an entrance ramp and exit ramp (freeway interchange)	A designated lane between entrance and exit ramps used to allow traffic to speed up and slow down.	A designated lane between entrance and exit ramps used to allow traffic to speed up and slow down. Reduces the conflict between exiting and entering traffic on the main lanes. Allows for efficient traffic flow at interchanges. The provided CMF/CRF addresses all crash types, including PDOs.	H56	0.20	Both	Segment	Safer Roads						X		
Extend deceleration lane by approximately 100 feet	An auxiliary or speed change lane, allows vehicles to slow down in a designate space.	An auxiliary or speed lane, allows vehicles to slow down in a designate space. Deceleration lanes allow traffic exiting a freeway to slow down to a safer speed without affecting the main flow of traffic. Oregon specifies an extension of an additional 100 feet from a freeway interchange. The provided CMF/CRF addresses all crash types, including PDOs.	H57	0.07	Both	Segment	Safer Roads						X		
Extend acceleration lane by approximately 100 feet	An auxiliary or speed change lane, allows vehicles to speed up in a designate space.	An auxiliary or speed change lane, allows vehicles to speed up in a designate space. Acceleration lanes increase safety by reducing freeway congestion through creating designated areas for merging traffic. Oregon specifies an extension of an additional 100 feet from a freeway interchange. The provided CMF/CRF addresses all crash types, including PDOs.	H58	0.11	Both	Segment	Safer Roads						X		
Add acceleration lane at freeway interchange	An auxiliary or speed change lane, allows vehicles to speed up in a designate space.	An auxiliary or speed change lane, allows vehicles to speed up in a designate space. Acceleration lanes increase safety by reducing freeway congestion through creating designated areas for merging traffic. Oregon calculates the CRF value via formula. The provided CMF/CRF addresses all crash types, including PDOs.	H59	Formula	Both	Segment	Safer Roads						X		

TOOLBOX OF SAFETY COUNTERMEASURES

								EMPHASIS AREAS							
COUNTERMEASURE NAME	SHORT DESCRIPTION	LONG DESCRIPTION (OR)	OR ID#	OR CRF	CONTEXT	LOCATION	SAFE SYSTEM ELEMENT	LANE/ROAD DEPARTURE	IMPAIRMENT	INTERSECTION	PEDESTRIANS	BIKES	SPEEDING	DISTRACTION	SCHOOLS
Reduce intersection skew angle on 3-leg minor street stop-controlled intersection	Reduce the skew of an intersection between intersecting streets.	Reduce the skew of an intersection between intersecting streets for a minor 3-leg stop-controlled intersection. Reducing the intersection skew angle results in increased sight distance for drivers and is beneficial to older drivers. The provided CMF/CRF addresses all crash types, including PDOs.	H60	Formula	Both	Intersection	Safer Roads			X					
Reduce intersection skew angle on 4-leg minor street stop-controlled intersection	Reduce the skew of an intersection between intersecting streets.	Reduce the skew of an intersection between intersecting streets for a 4-leg minor street stop-controlled intersection. Reducing the intersection skew angle results in increased sight distance for drivers and is beneficial to older drivers. The provided CMF/CRF addresses all crash types, including PDOs.	H61	Formula	Both	Intersection	Safer Roads			X					
Install offset or buffered right-turn lane	A right-turn lane that is offset by moving the lane laterally.	A right-turn lane that is offset by moving the lane laterally so that vehicles in right-turn lanes no longer obstruct the view of the driver on the minor road approach. The provided CMF/CRF addresses all crash types, including PDOs.	H65	0.69	Both	Intersection	Safer Roads			X					
Install speed humps or table on non-state highways	A speed hump is a raised area (normally 3-4 inches in height) in the roadway pavement surface extending transversely across the roadway.	A speed hump is a raised area (normally 3-4 inches in height) in the roadway pavement surface extending transversely across the roadway. Speed humps are effective at reducing traffic speeds by forcing drivers to slow down and increase driver awareness. Oregon specifies that this countermeasure be installed on non-state highways.The provided CMF/CRF addresses all crash types, including PDOs.	H66	0.50	Both	Segment	Safer Roads						X		
Intersection Lighting (Bike & Ped)	Provide intersection lighting for other modes of transportation	A permanent source of artificial light installed at an intersection that provides greater visibility of the intersection. The provided CMF/CRF addresses all crash types, not including PDOs.	BP2	0.42	Both	Intersection	Safer Roads			X		X			
Install Refuge Island	Concrete refuge islands seperate crossing pedestrians from motor vehicles.	Concrete pedestrian refuge islands are safe spaces for pedestrians crossing intersections, separating them from traffic and allowing them to cross one direction at a time. They can be placed at unsignalized intersections or midblock locations. The provided CMF/CRF addresses all crash types, including those resulting only in property damage (PDOs).	BP8	0.31	Rural	Segment	Safer Roads				X	X			
Install crosswalk markings and advance pedestrian warning sign at uncontrolled locations	A marked crosswalk using pavement markings and signage to indicate pedestrians are crossing	A crosswalk is a location where the pedestrian leaves the sidewalk and enters the roadway and the pedestrian's path of travel crosses the motorist's path of travel. Marked crosswalks use pavement markings and advance pedestrian warning signs to indicate optimal or preferred locations for pedestrians to cross and help designate right of way for motorists to yield to pedestrians. The provided CMF/CRF addresses all crash types, including PDOs.	BP15	0.15	Both	Both	Safer Roads				X				
Install pedestrian or bicycle warning signs	Yellow signs warning of pedestrians and/or bicycles	A yellow warning sign that brings awareness of the presence of pedestrians and cyclist. The provided CMF/CRF addresses all crash types, including PDOs.	BP17	0.05	Rural	Both	Safer Roads			X	X	X			
Install Bike Lanes	A portion of the roadway marked by signing and striping for exclusive use by bicyclists	Bike lanes are defined as a portion of the roadway that has been designated by signing and pavement marking for the preferential or exclusive use by bicyclists. Typically, there is one bike lane provided on each side of the roadway and travels in the same direction as the motorized vehicle lane. The provided CMF/CRF addresses all crash types, including PDOs.	BP22	0.36	Both	Both	Safer Roads			X		X			
Install Sidewalk	A paved path dedicated to pedestrians	A sidewalk is a paved path, located along roadways, designated for use by pedestrians. Sidewalks are usually raised and can be separated from roads by curbs and/or planting strips or swales. The provided CMF/CRF addresses all crash types.	BP29	0.20	Both	Segment	Safer Roads				X				
Convert "Y" intersections to "T" intersections		Improve traffic control, signing, and striping at rural "Y" intersections.			Rural	Intersection	Safer Roads	X							
Elementary-age child pedestrian training		Equip school-age children with knowledge and practice to enable them to walk safely in environments with traffic.			Both		Safer People				X				
Bicycle safety education for children		Increase bicyclist and motorist awareness by providing education, outreach, and training.			Both		Safer People					X			
Cycling skills clinics, bike fairs, bike rodeos		Provide events that promote improving bicycle skills.			Both		Safer People					X			
Employer programs		Employers can address drowsy driving by providing documents and sponsor events to encourage getting to work safely.			Both		Safer People		X						
Install impact attenuators		Install impact attenuators to shield rigid roadside objects that help bring an errant vehicle to a stop.			Both	Segment	Safer Roads	X							
Install no-passing line		Install pavement markings that differentiate between passing and no-passing areas.			Both	Segment	Safer Roads	X							
Install animal fencing		Install animal fencing at locations with high animal/vehicle crashes or where there is frequent animal crossing due to migratory patterns.			Rural	Both	Safer Roads								

Marion County

Transportation Safety Action Plan

Appendix B: Existing Safety Conditions (2017-2021 Data)

DKS 117 COMMERCIAL STREET NE, SUITE 310, SALEM, OR 97301 • 503.391.8773 • DKSASSOCIATES.COM

SAFETY DATA COLLECTION & ANALYSIS - FINAL

DATE: August 18, 2023

TO: Project Management Team | Marion County

FROM: Lacy Brown, Ph.D., P.E., R.S.P$_1$, Kayla Fleskes-Lane, P.E. & Brianna Velasquez, EIT | DKS Associates

SUBJECT: Marion County TSAP - Existing Safety Data Collection & Analysis DKS Project #24019-000

This memorandum presents the findings of a comprehensive safety analysis in the development of the Marion County Transportation Safety Action Plan (TSAP).

PROJECT LOCATION

Marion County is located in northwest Oregon, in the heart of the Willamette Valley. It has the Willamette River as its western boundary and the Cascade Mountain Range on the east. Encompassing nearly 1,200 square miles, the Marion County safety study includes all county owned roadways, as shown in Figure 1.

There are 20 incorporated cities and 37 unincorporated communities in Marion County. As reported by the 2020 Census, the total population of Marion County was 345,920[1].

[1] Full access to Marion County U.S. Census Bureau information: https://www.census.gov/quickfacts/marioncountyoregon

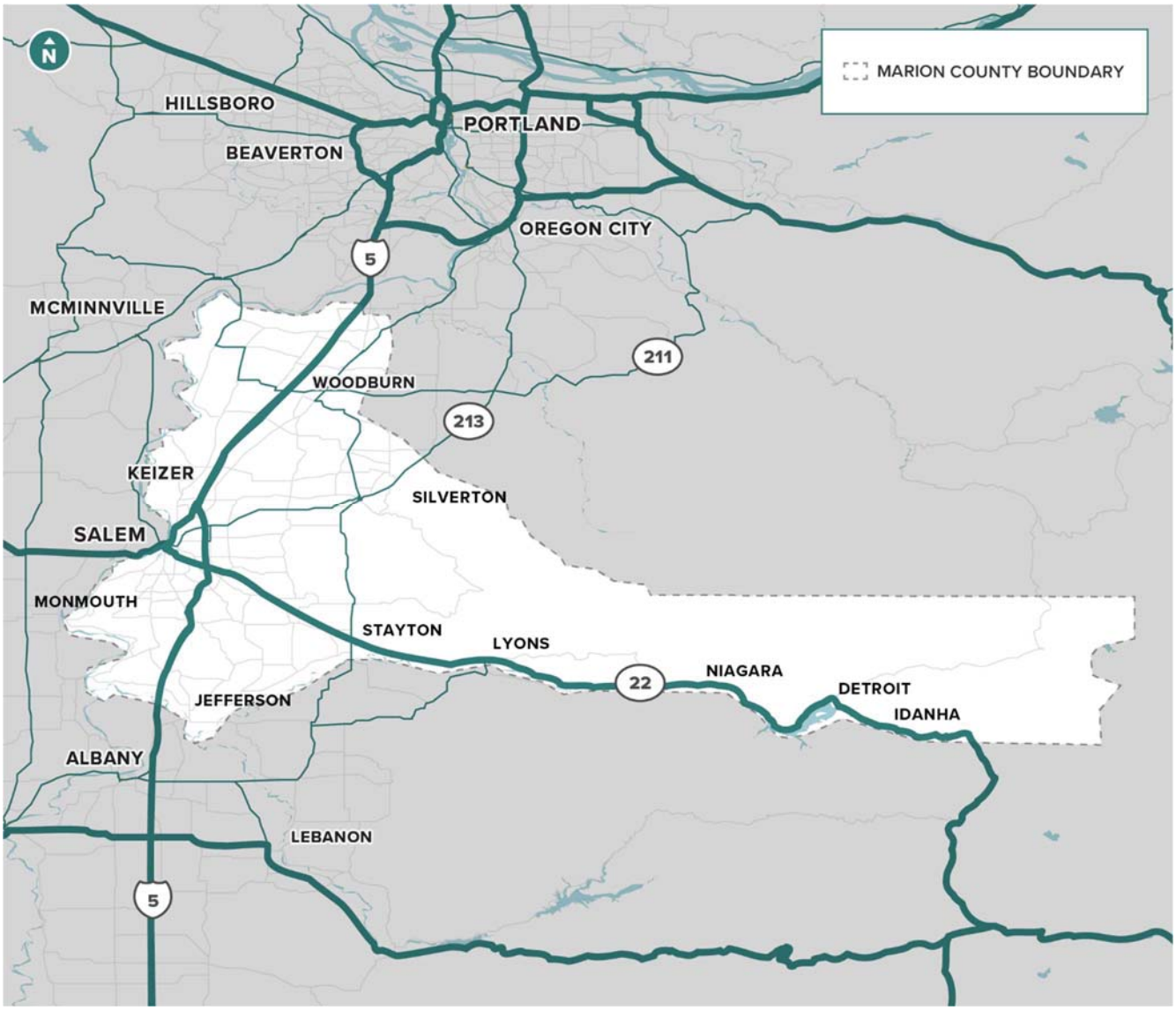


FIGURE 1. STUDY AREA MAP

EXISTING SAFETY ANALYSIS

A safety assessment was conducted to evaluate the existing safety performance of the County roadways using the most recent five years of crash data available from Oregon Department of Transportation (ODOT) (2017-2021). The following sections summarize the key findings relating to County crash trends and identification of high-crash locations.

CRASH DATA

Crash records provide all data collected by the reporting officer, including crash identification (jurisdiction, route and postmile, location, date, time), demographics (age, sobriety), environmental (lighting, weather, road surface), and crash details (primary collision factor, type of collision, vehicle/party type, severity).

For this safety analysis, crash severity is categorized as follows:

- **Fatal:** A collision that results in the death of a person within 30 days of the collision.
- **Serious Injury:** A collision that results in broken bones, dislocation, severe lacerations, or unconsciousness, but not death.
- **Minor Injury:** A collision that results in other visible injuries, including minor lacerations, bruising, and rashes.
- **Possible Injury:** A collision that results in the complaint of non-visible pain/injury, such as confusion, limping, and soreness.
- **Property Damage Only (PDO):** A collision without injury or complaint of pain but resulting in property damage to a vehicle or another object, commonly referred to as a "fender bender."

COUNTY-WIDE CRASH SUMMARY

Between 2017 and 2021, 2,066 crashes were reported within Marion County. Of those crashes, 771 occurred at intersections (37 percent of total), but more specifically, 594 crashes (29 percent of total) took place at stop-controlled intersections.

An average of 413 crashes occurred per year as shown in Table 1. While the number of fatal and serious injury crashes remained consistent, the number of minor injuries increased, and the number of possible injuries and PDO crashes dropped slightly.

TABLE 1: CRASH SEVERITY PER YEAR (2017-2021)

SEVERITY	2017	2018	2019	2020	2021	TOTAL	YEARLY AVERAGE
FATAL	9	10	13	9	10	51	**10**
SERIOUS INJURY	25	28	25	25	25	128	**26**
MINOR INJURY	86	104	96	95	105	486	**97**
POSSIBLE INJURY	118	134	145	112	106	615	**123**
PDO	176	143	135	170	162	786	**157**
TOTAL	**414**	**419**	**414**	**411**	**408**	**2,066**	**413**

Among the leading crash types recorded in Marion County were fixed object crashes, rear-end crashes, and turning movement crashes, summarized below in

TABLE 2. THIS TABLE PROVIDES A BREAKDOWN OF THE LEADING CRASH TYPES AND CAUSES IN ADDITION TO THOSE SPECIFICALLY RELATED TO HIGH SEVERITY INJURIES (SERIOUS INJURY OR FATALITY, 179 IN TOTAL). SIMILAR INFORMATION IS ALSO PRESENTED GRAPHICALLY IN

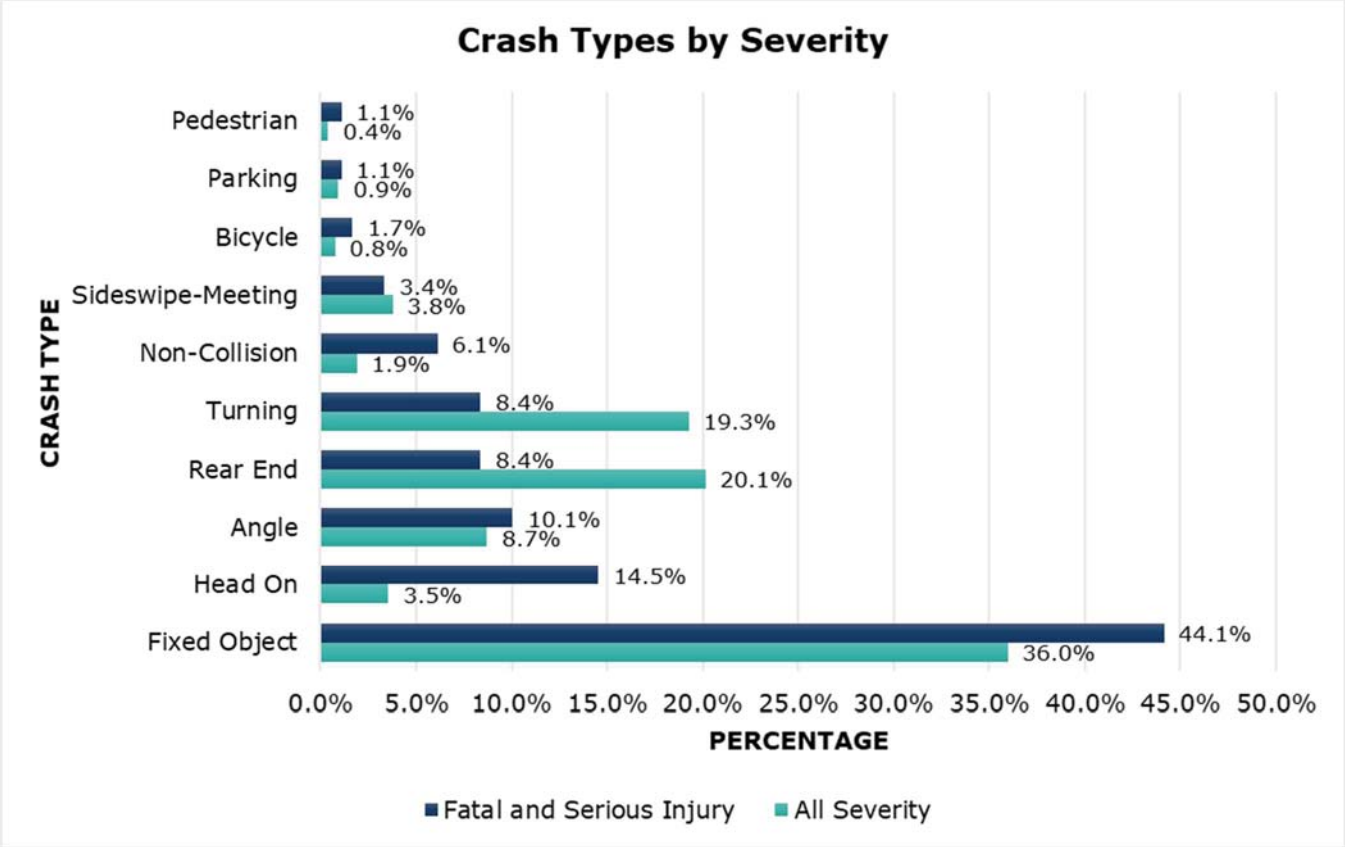


Figure 2. Crash characteristics with notably higher proportions under the 'high severity only' column indicate those crash types are more likely to result in fatal or serious injuries in Marion County.

TABLE 2: SUMMARY OF LEADING CRASH CHARACTERISTICS IN MARION COUNTY, 2017 - 2021

CHARACTERISTIC	ALL SEVERITIES		HIGH SEVERITY ONLY	
	COUNT	PERCENTAGE	COUNT	PERCENTAGE
TOP CRASH TYPES				
FIXED OBJECT	743	36.0%	79	44.1%
REAR END	419	20.3%	16	8.9%
TURNING	404	19.6%	16	8.9%
ANGLE	183	8.9%	18	10.1%
SIDESWIPE-MEETING	78	3.8%	6	3.4%
HEAD-ON	73	3.5%	26	14.5%
NON-COLLISION	39	3.1%	11	6.2%
TOP CRASH CAUSES				
DID NOT YIELD RIGHT-OF-WAY	418	20.2%	22	12.3%
FAILED TO AVOID VEHICLE AHEAD	265	12.8%	7	3.9%
TOO FAST FOR CONDITIONS	254	12.3%	40	22.4%
OTHER IMPROPER DRIVING	210	10.2%	22	12.3%
INATTENTION	167	8.1%	21	11.7%
CARELESS	104	5.0%	13	7.3%
SPEEDING (BEYOND SPEED LIMIT)	55	2.7%	10	5.6%

AS SHOWN IN

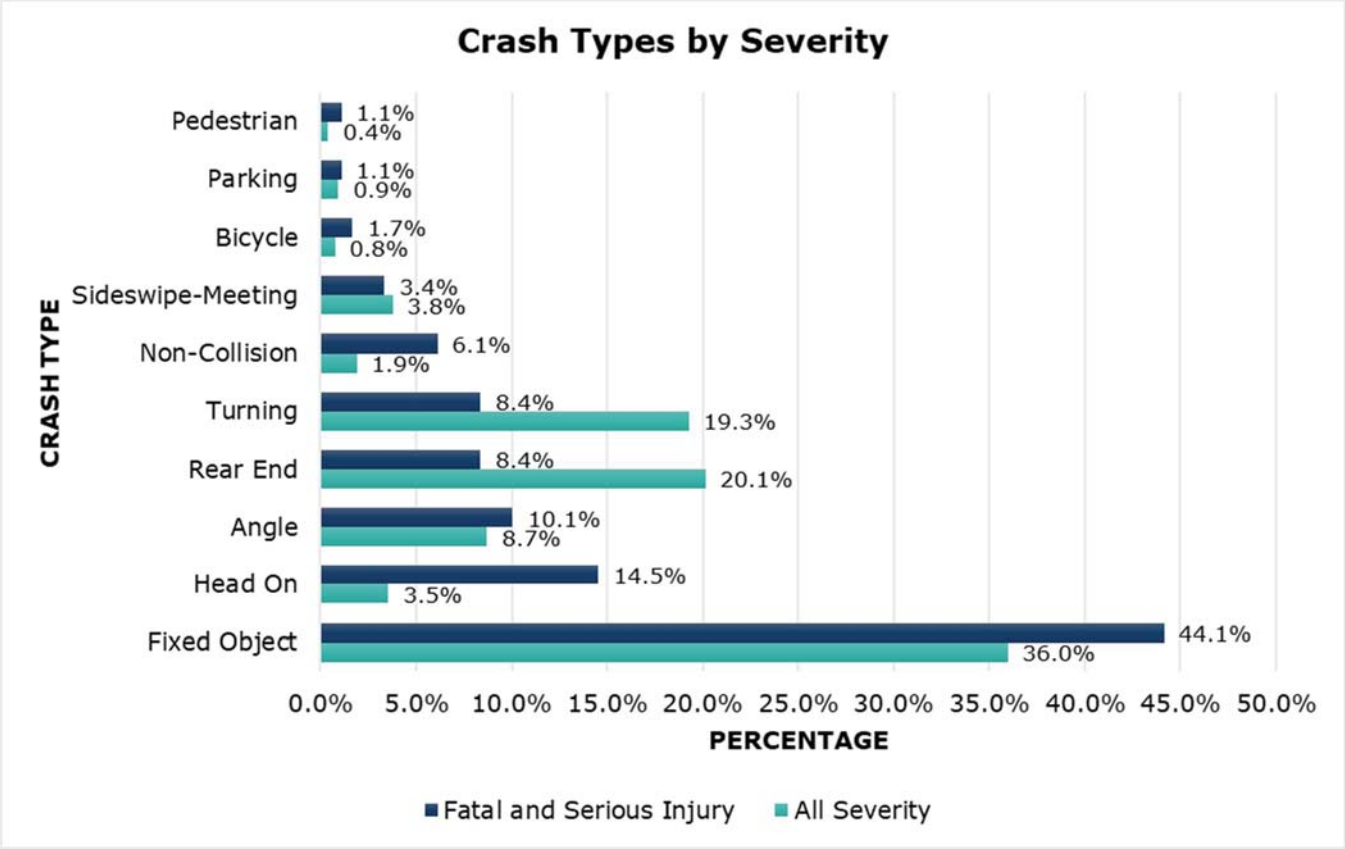


Figure 2, fixed-object, angle, head-on, and non-collision (single-vehicle rollover) crashes are overrepresented in high severity crashes on Marion County roadways. Crash types not shown on this graphic - sideswipe-overtaking, backing, and unknown – represent less than 1% of fatal and serious injury crashes.

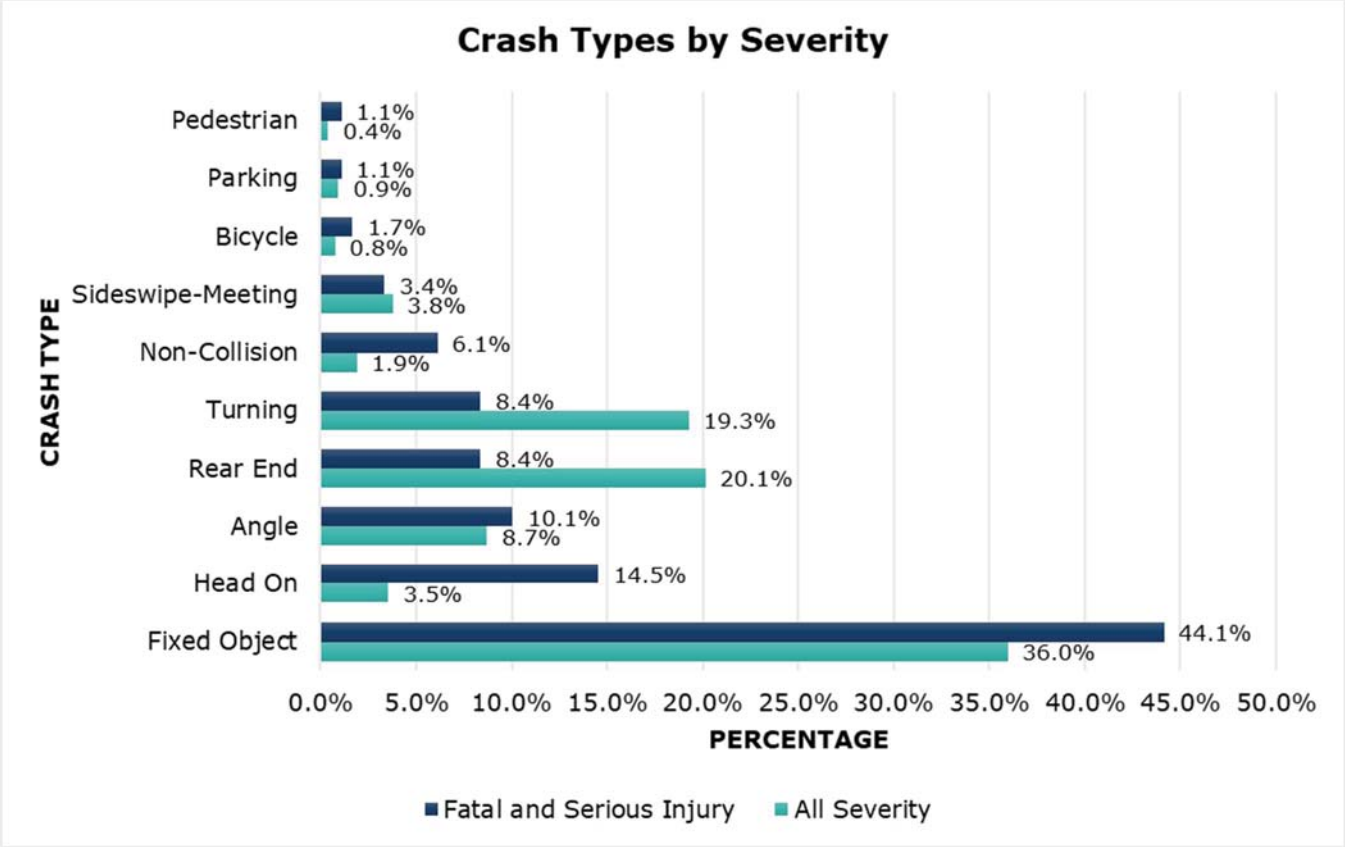


FIGURE 2. PROPORTIONS OF CRASH TYPES BY SEVERITY

FIXED OBJECT CRASHES

During the study period, 743 fixed object crashes occurred on Marion County roadways resulting in 79 fatalities or serious injuries (nearly half of all fatal and serious injury crashes in the County involved a fixed object). About a third of these (34 percent) involved vehicles that entered a ditch, eleven percent hit a tree, and nine percent struck a utility pole.

The leading crash cause of fixed object crashes was speeding, accounting for approximately 40% of all fixed object crashes. Besides "other improper driving" and distracted driving, the other overrepresented crash cause in fixed object crashes was fatigue at seven percent, which is nearly three times the percentage in all other crash types (three percent). In total, 50 of the 54 fatigue-related crashes were fixed object crashes. Alcohol impairment was involved in a substantially higher percentage of fixed object than other crash types (16 versus 8 percent, respectively).

Weather and lighting also play a role in fixed object crash patterns. Approximately 44 percent of all fixed object crashes occurred in dark, dawn, or dusk conditions compared to 29 percent for other crash types. Wet, snowy, and icy roadway conditions were noted in 35 percent of fixed object crashes compared to 28 percent for other crash types.

REAR-END CRASHES

In Marion County, 419 rear-end crashes were reported from 2017 to 2021. About half (45 percent) of these crashes were stopped vehicles struck from behind after being failed to be avoided. Overall, 60 percent of the rear-end crashes reported were caused by failure to avoid the vehicle ahead. Other leading causes included following too close (12 percent), inattention (12 percent), and carelessness (seven percent).

The majority of the rear-end crashes reported involved a stopped vehicle (306 in total, 73 percent), while 16 percent involved vehicles traveling straight, and eight percent involved turning vehicles. Approximately half (48 percent) of the rear-end crashes reported were intersection related; 112 crashes (27 percent) were attributed to stop-controlled intersections, while 29 crashes (seven percent) were attributed to signalized intersections. Figure 3 distinguishes the severity suffered in the intersection related rear-end crashes and those not related. As shown, no rear-end crash resulting in a fatality was intersection related. Additionally, rear-end crashes resulting in possible injuries are overrepresented at intersections, accounting for nearly a quarter of the rear-end crashes (24 percent).

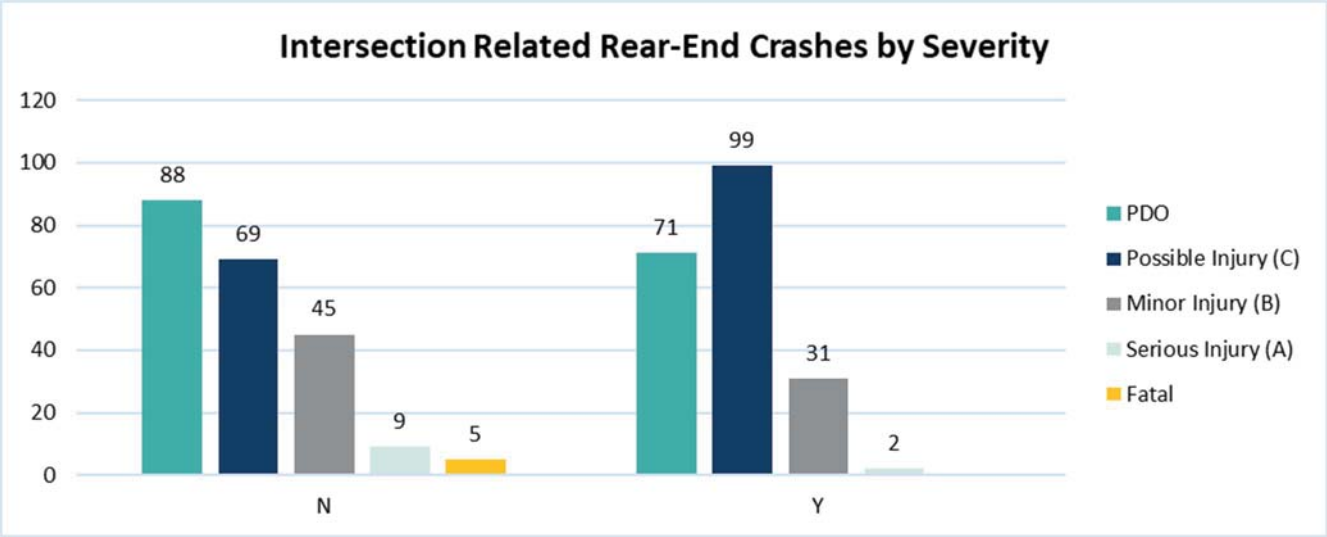


FIGURE 3: INTERSECTION RELATED REAR-END CRASHES BY SEVERITY (2017-2021)

BICYCLE AND PEDESTRIAN CRASHES

Bicycle facilities are limited throughout the County; most are concentrated in and around urban areas. Bicycle, pedestrian, and public transportation are important components of the County's transportation system plan.

During the study period, nine pedestrian crashes and sixteen bicycle crashes were reported along County roadways. Ten of the crashes took place in urban areas, while fifteen others took place in rural areas. Based on road characteristics, thirteen were along straightaways, ten at intersections, one in an alley, and one at a curve. The majority took place in clear, day or daylight conditions (72 percent).

Two pedestrian crashes resulted in fatalities. The first one occurred in 2018 along Aumsville Highway SE. The crash took place during the day in clear, dry conditions. The crash record indicates the driver was headed southbound and failed to yield the right-of-way to an older pedestrian crossing eastbound between intersections. The driver was noted as driving under the influence of marijuana. A second pedestrian crash resulted in a fatality near MP 2.56 along Lakeside Drive NE. The crash occurred in the evening in dark, rainy conditions. A teenage driver headed northbound struck a pedestrian that was walking along the roadway in the same direction as traffic. Along the same roadway, approximately one month before this pedestrian-involved crash, a bicyclist was struck near MP 0.20. According to the crash record, a teenage driver headed eastbound rear-ended a bicyclist on the roadway. The record indicated the bicyclist was under the influence of drugs, and inattention was also noted as a contributing factor. The crash occurred in the middle of the night (3AM) in clear, dry conditions.

The second bicycle crash that resulted in a fatality occurred at MP 4.12 along Hazelgreen Road NE near Chemawa. It was a sideswipe crash involving an eastbound driver and an eastbound cyclist on the shoulder. View obstruction and failure to yield the right-of-way to the pedalcyclist were listed as the primary contributing factors. The crash occurred on a clear, dry day.

TABLE 3. SUMMARY OF MARION COUNTY CRASH ATTRIBUTES

DATA ELEMENT	CRASH ATTRIBUTE	%OF ALL COLLISIONS WITH THIS ATTRIBUTE [A]	%OF F&A COLLISIONS WITH THIS ATTRIBUTE
Collision Type	Roadway or Lane Departure [B]	39.9%	**60.9%**
	Fixed Object	36.0%	**44.1%**
	Non-Collision/Overturning	1.9%	**6.1%**
	Head-On	3.5%	**14.5%**
	Turning	19.6%	8.9%
	Rear End	20.3%	8.9%
	Sideswipe – Meeting	3.8%	3.4%
Contributing Circumstance (For at least one vehicle)	Exceeding Reasonable Safe Speed or Exceeding Stated Speed Limit	19.5%	**35.8%**
	Alcohol-Impaired	7.8%	**25.1%**
	Drug-Impaired	2.4%	**17.9%**
	Inattention / Distraction	8.1%	**11.7%**
Motor Type Involved	Motorcycle	3.3%	**14.0%**
	Heavy Vehicle	5.2%	3.4%

DATA ELEMENT	CRASH ATTRIBUTE	%OF ALL COLLISIONS WITH THIS ATTRIBUTE [A]	%OF F&A COLLISIONS WITH THIS ATTRIBUTE
Lighting Condition	Dark/Dusk/Dawn	28.9%	28.5%
Roadway Characteristic	At Intersection or Intersection Related	37.3%	22.4%
	At Traffic Signal	3.6%	1.1%
	At Stop Sign	29.0%	**19.0%**
	Straight Segment	37.5%	**40.1%**
	Horizontal Curve	18.3%	**28.5%**
	Vertical Curve	0.2%	**2.8%**
	Alley or Driveway	8.7%	5.0%
Road User	Younger Pedestrian/Cyclist (Age <21) [C]	0.3%	0.0%
	Older Pedestrian/Cyclist (Age 64+) [C]	0.2%	**0.6%**
	Younger Driver	18.3%	**27.4%**
	Older Driver	6.5%	**13.4%**
Road Surface Conditions	Wet	24.1%	19.6%
	Ice	2.5%	**3.9%**

[A] Crashes with multiple data elements are listed in each applicable row.

[B] Roadway or Lane Departure crashes include the following crash types: Fixed Object, Head-on, Non-collision/Overturning, Sideswipe – Meeting, Pedestrian (not in roadway), Other

[C] %ages reflect injury crashes only as participant age is not recorded for property damage only (PDO) crashes.

The data shown in the figures and tables above indicate the following about fatal and serious injury crashes on Marion County roadways:

- 60 percent of fatal and serious injury crashes involved a driver leaving the roadway.
- Vulnerable road users are overrepresented in fatal and serious injury crashes. Pedestrians, bicyclists, and motorcyclists were involved in 4.5 percent of all crashes, but 17 percent of fatal and serious injury crashes. When a collision occurs with a vulnerable road user, the risk of injury is high.

- Risky behaviors are overrepresented in fatal and serious injury crashes, where 36% involved speeding, 25% involved alcohol impairment, 18% involved drug impairment, and 12% involved distraction.
- Younger drivers (under age 21) were involved in nearly one-third (27%) of fatal and serious injury crashes.

Figure 4 below shows a map of fatal and serious injury crashes on Marion County roadways.

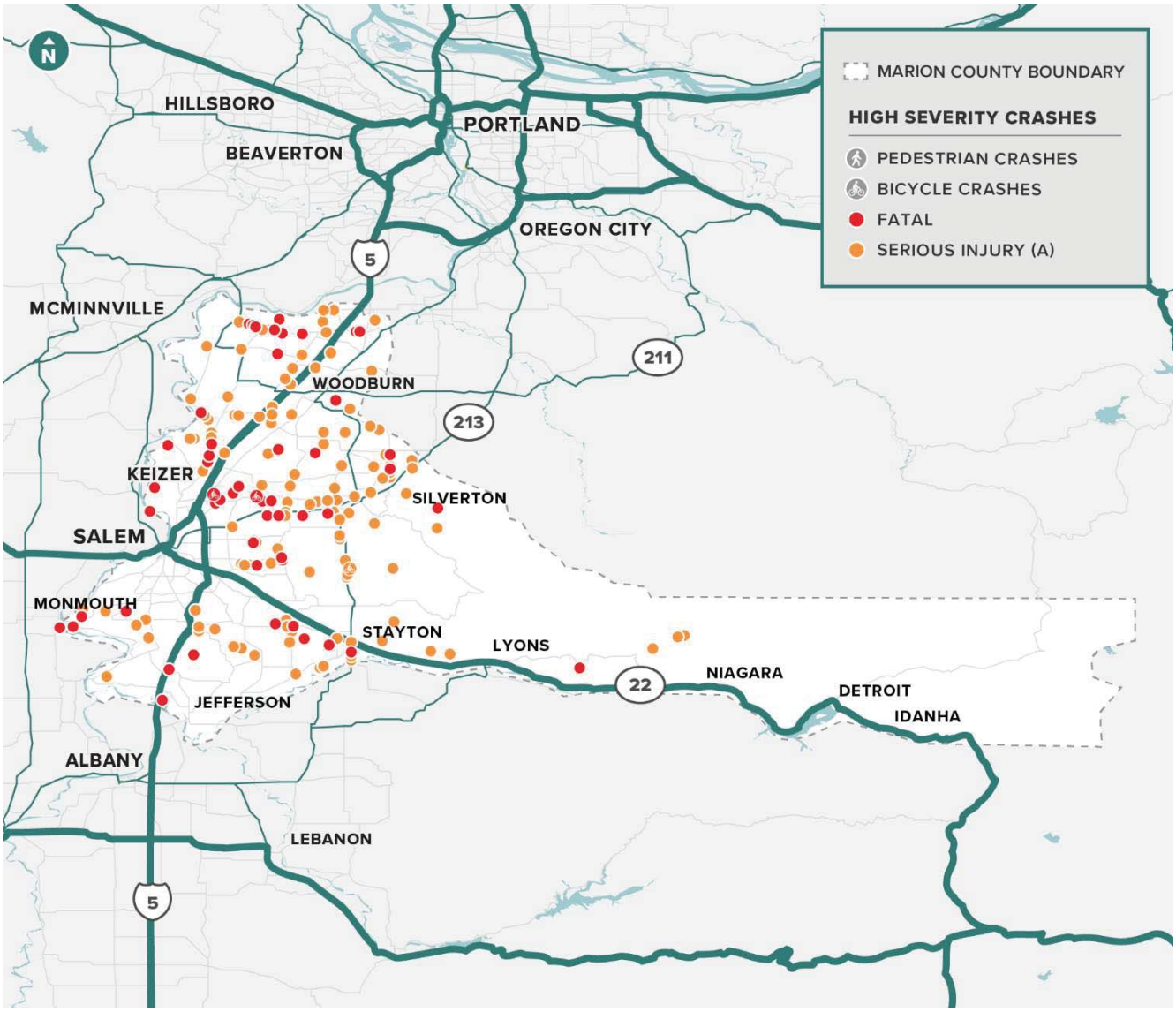


FIGURE 4. FATAL AND SERIOUS INJURY CRASHES IN MARION COUNTY (2017-2021)

CRASH TRENDS ON COUNTY ROADWAYS IN SMALL CITIES

Rural communities within the study area include Aurora, Detroit, Donald, Gates, Gervais, Hubbard, Idanha, Mill City, Scotts Mills, St. Paul, Sublimity, and Turner. Approximately 70 crashes (3 percent of all crashes along County roadways), including three serious injury crashes, occurred in these rural communities on county-owned roadways from 2017-2021. A comparison of crash trends in rural communities versus the entire study area is summarized in Table 4.

TABLE 4. CRASH TRENDS IN RURAL COMMUNITIES

CHARACTERISTIC	MARION COUNTY		RURAL COMMUNITIES	
	COUNT	%	COUNT	%
TOP CRASH TYPES, ALL SEVERITIES				
FIXED OBJECT	743	36.0%	13	18.6%
REAR END	419	20.3%	23	32.9%
TURNING	404	19.6%	15	21.4%
ANGLE	183	8.9%	6	8.6%
PARKING	19	0.9%	4	5.7%
HEAD-ON	73	3.5%	2	2.9%
TOP CRASH CAUSES, ALL SEVERITIES				
DID NOT YIELD RIGHT-OF-WAY	418	20.2%	18	25.7%
FAILED TO AVOID VEHICLE AHEAD	265	12.8%	20	28.6%
TOO FAST FOR CONDITIONS	254	12.3%	3	4.3%
OTHER IMPROPER DRIVING	210	10.2%	4	5.7%
INATTENTION	167	8.1%	3	4.3%
CARELESS	104	5.0%	2	2.9%
SPEEDING (BEYOND SPEED LIMIT)	55	2.7%	1	1.4%
OTHER CHARACTERISTICS				

WET/ICY ROAD CONDITIONS	550	26.6%	15	21.4%
DARK/DAWN/DUSK	596	28.9%	12	17.1%
ALCOHOL-IMPAIRED	162	7.8%	3	4.3%
SPEED INVOLVED	403	19.5%	6	8.6%
ON STRAIGHT SEGMENT	774	37.5%	23	32.9%
ALLEY OR DRIVEWAY-RELATED	180	8.7%	8	11.4%
AT INTERSECTION OR INTERSECTION-RELATED	771	37.3%	37	52.9%
BICYCLE-INVOLVED	16	0.77%	0	0%
PEDESTRIAN-INVOLVED	9	0.44%	0	0%
YOUNGER USER INVOLVED (AGE 0-21)	379	18.3%	6	8.6%
OLDER USER INVOLVED (AGE 64+)	134	6.5%	4	5.7%
FATAL OR SERIOUS INJURY CRASHES	179	8.7%	3	4.3%

As shown in the table above, crashes in rural communities are more likely to occur at intersections and involve rear ends, parking, and turning collisions than the rest of the study area. Zero bicycle and pedestrian-involved crashes were recorded on county-owned roadways in small communities during this study period.

ODOT SAFETY PRIORITY INDEX SYSTEM (SPIS) LOCATIONS

The Safety Priority Index System (SPIS) is a ranking system developed by ODOT to identify and compare locations with safety problems on state highways. SPIS scores are developed based upon crash frequency, crash severity, and rate for a 0.10 mile or variable length segment along the state highway over a rolling three-year window (i.e., every year it is updated with the most recent three years). A prioritized list of the top 15% of statewide SPIS sites is created for each region, and the top 5% are investigated by the five Region Traffic managers' offices.

The percentile rankings are based on the percentage of SPIS scores that are the same or lower than a selected SPIS score. For example, a SPIS score that is higher than 95 percent of all SPIS scores is at the 95th percentile. Similarly, 90th percentile SPIS score is higher than 90 percent of all SPIS scores (i.e., in the top 10 percent), but it is below and not within the top 5% (95th percentile) of all SPIS scores.

Marion County had nineteen SPIS sites in the top 5% in 2021, shown in Table 5 and Figure 5 below.

TABLE 5: MARION COUNTY 2021 - 5% SPIS SITES OFF-STATE

ROAD NAME	REF. LOCATION DESCRIPTION	APPX. DISTANCE/DIR.[A]	AVG. ADT	AVG. SPIS
Airport Rd NE	NE Countryside Dr	3000/180	3,200	68.79
Clear Lake Rd NE	Suffolk Rd NE	0/0	1,000	76.83
Lancaster Dr NE	Devonshire Ave NE	500/0	21,400	75.54
Clear Lake Rd NE	Quinaby Meadows Ln NE	1400/270	1,300	74.82
Cordon Rd	Carolina Ave NE	8500/178	13,700	73.09
Cordon Rd	Carolina Ave NE	3000/170	12,000	72.30
Lancaster Dr SE	LA Branch St SE	600/2	22,500	65.90
Cordon Rd	Acts Way NE	2500/178	13,300	70.09
35TH Ave NE	Perkins St NE	500/180	800	67.42
Lancaster Dr NE	Rich Dr NE	900/0	12,300	62.49
Lancaster Dr NE	Rich Dr NE	800/1	16,500	64.15
State St	40th Pl NE	650/270	16,400	64.96
Lancaster Dr NE	Iberis St NE	700/1	10,300	64.00
Lancaster Dr NE	Iberis St NE	370/0	10,300	66.42
Lancaster Dr NE	Monroe Ave NE	1500/1	28,000	60.84
Lancaster Dr NE	Hudson Ave NE	0/0	28,000	63.05

ROAD NAME	REF. LOCATION DESCRIPTION	APPX. DISTANCE/DIR.[A]	AVG. ADT	AVG. SPIS
Lancaster Dr NE	South New Castle Cir NE	0/0	10,300	61.55
Lancaster Dr NE	Monroe Ave NE	0/0	28,000	59.36
Silverton Rd NE	Hermosa Ct NE	1,200/267	10,000	56.66

[A] Distance in feet and direction in degrees (0-359) from the reference location to the segment begin point. Distance is measured along the road and direction is measured straight line aka 'as the crow flies'. 0 = due north, 90 = due east, 180 = due south, 270 = due west

A few of the locations have previously been listed among the Top 5% SPIS Sites:

- 2019:
    - Lancaster Dr NE/Devonshire Ave NE
    - Lancaster Dr NE/Rich Dr NE
    - Lancaster Dr SE/LA Branch St SE
    - Lancaster Dr NE/Monroe Ave NE
- 2020:
    - Clear Lake Rd NE/Suffolk Road NE
    - Clear Lake Rd NE/Quinaby Meadows Ln NE
    - Cordon Rd/Carolina Ave NE
- 2019, 2020:
    - Lancaster Drive NE/Iberis Street NE

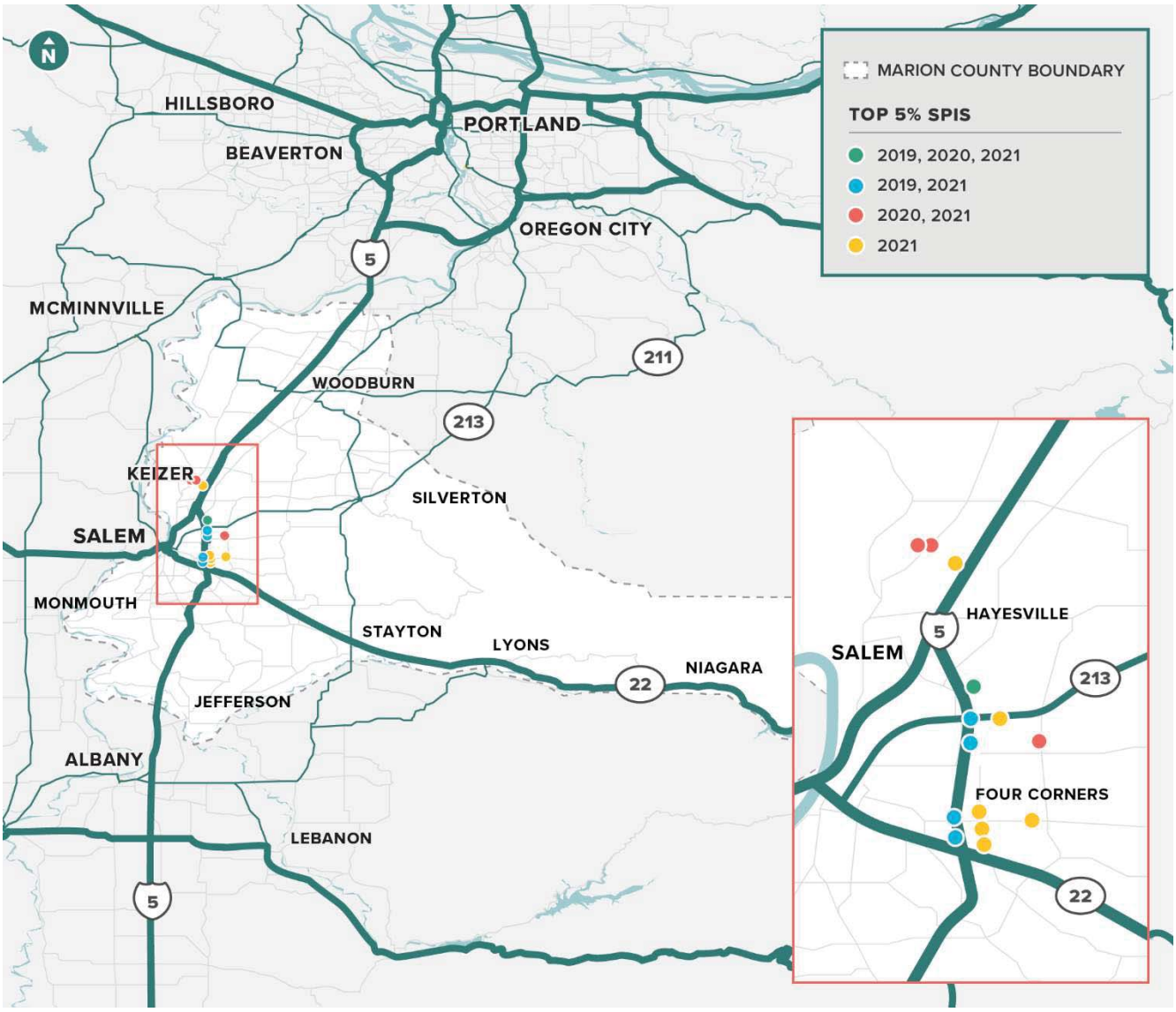


FIGURE 5: MARION COUNTY 2021 TOP 5% SPIS SITES

SUMMARY OF KEY CRASH PATTERNS IN MARION COUNTY

The safety analysis identified several key crash patterns along Marion County roadways, particularly those contributing to high severity crashes. To be able to prioritize these problems, the Safe System approach was utilized to address the five key elements:

1. Safe Road Users: Approximately 98% of the people killed or injured on Marion County roadways were in a vehicle (2017-2021 data). Risky behaviors such as impairment, speeding, and distraction were overrepresented in high severity crashes, and often contributed to the high severity crash types including fixed-object, head-on, and angle crashes. Among high severity crashes, younger drivers (21 or younger) were involved in approximately 30% of them. While the number of bicyclists and pedestrians involved in

crashes is relatively low, the risk of serious injury for these vulnerable road users is disproportionately high.

2. Safe Speeds: Speeding was the leading contributing factor of all crashes recorded on Marion County roadways. Nearly 35% of high severity crashes involved speeding.
3. Safe Roads: Proposed road design improvements should focus on creating more roads that are forgiving of mistakes and human frailty. Nearly half of all fatal and serious injury crashes in the County involved a fixed object, of which a third involved vehicles entering a ditch. Not to mention, approximately four in every five fatal and serious injury crashes occurred at intersections with stop signs.
4. Safe Vehicles: Approximately 3% of all crashes involved a motorcycle, compared to 14.5% of fatal and serious injury crashes.

Crash data alone does not provide as many insights for Safer Vehicles and Post Crash Care elements of the Safe System Approach, however, both of these elements will be incorporated into the TSAP goals, projects, and strategies.

Marion County

Transportation Safety Action Plan

Appendix C: Supplemental ODOT Crash Analysis

Oregon
Tina Kotek, Governor

Department of Transportation
Policy, Data and Analysis Division
355 Capitol St NE, MS 42
Salem, OR 97301
Phone: (503) 302-6095

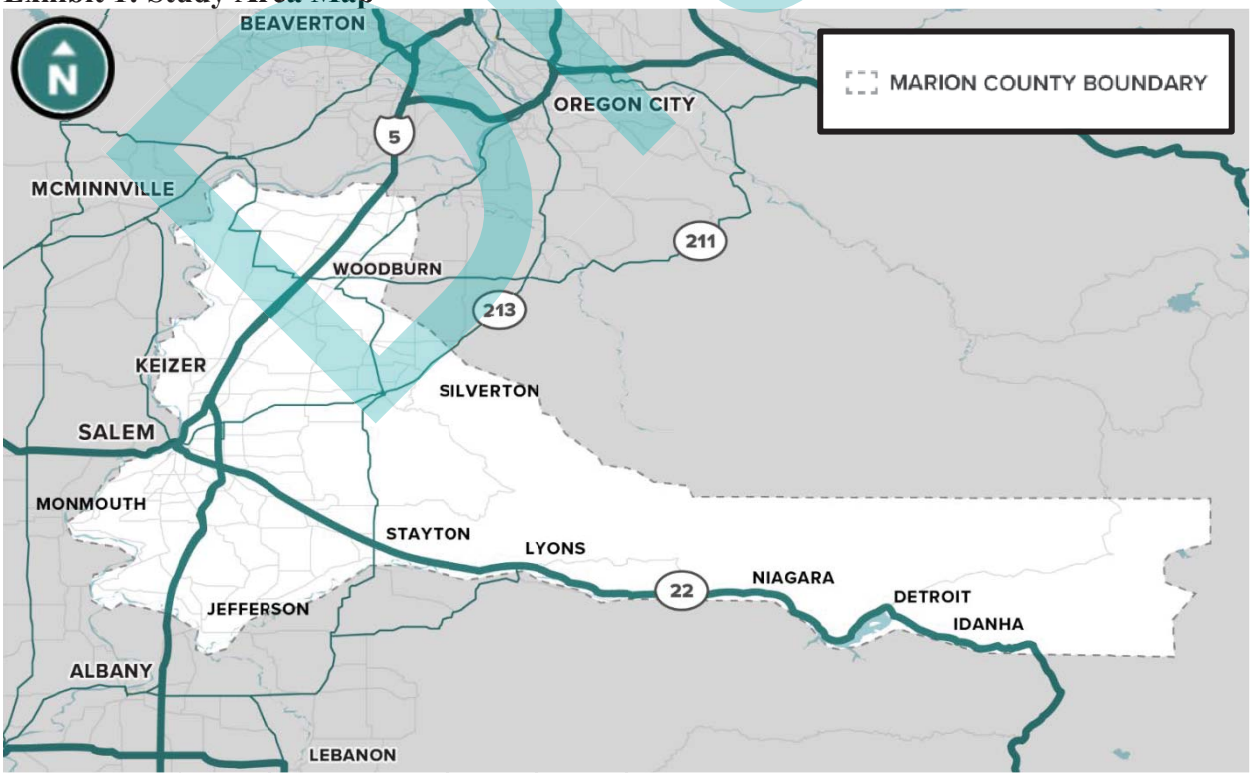
Date: January 21, 2025
To: Project Management Team | Marion County
From: Leia Kagawa, P.E. | Senior Transportation Analyst
Transportation Planning Analysis Unit (TPAU)
Subject 2D-22 Marion County TSP Crash Analysis

The purpose of this memorandum is to document existing safety issues on roadways in the Marion County Rural Transportation System Plan (TSP), (study area) particularly study intersections, see Exhibit 1. The 66 identified study area intersections where the first 40 (#1 to #40) are to be further analyzed by the TSP consultant and the remaining 26 (#1-C to #26-C) by Marion County, see Appendix C.

Crash Analysis

Crash deficiencies should be addressed within the build alternatives. The crash analysis is based off the official reported crashes submitted to ODOT's Crash Analysis and Reporting Unit (CARU) for the study for 2017, 2018, 2019, and 2022 (analyzed years). Note that data from 2020-2021 are excluded. The COVID-19 pandemic impacted travel patterns most between 2020-2021. The impacts result in abnormal traffic volumes, destinations and trends that should not be factored in typical crash analysis.

Exhibit 1: Study Area Map



Crash Types

The crashes in the study area represent typical crashes for rural or urban-fringe areas with an interstate with high truck volumes, see Appendix A.
Rear-ends in rural areas are generally caused by motorists' inattention and colliding into a vehicle at an intersection. At interstate ramps, rear-end collisions are generally caused queues extending from the ramps to the mainline.

Turning and angle collisions are caused by motorists taking improper gaps in traffic or failing to yield the right-of-way.

Overtaking sideswipe collisions often caused by motorist's inattention such as not using mirrors or following too closely. However, at interstate ramps, these kinds of collisions are generally caused by merging on or off a congested ramp.

Roadway departures are often caused by motorists' s inattention, loss of control due to speeding or other risky behaviors such as alcohol or substance abuse. In the study area 1,303 (14%) of crashes were flagged for roadway departures while 74 (12%) of study intersection crashes were flagged.

The ongoing Marion County Transportation Safety Action Plan (TSAP)[1] identifies potential countermeasures for roadway departures and intersection crashes and should be referenced in developing build alternatives.

Crash Analysis Summary

The following sections show the summarized crash analysis statistics the study area.
For the analyzed years, there were 9,206 reported crashes in Marion County with, 4,551 in the study area. Within the study area 1,284 were in the urban fringe and 642 (14%) were associated with the 66 study intersections. These crashes mostly occurred in dry, daytime conditions, see Table 1.

Table 1: Study Intersections – Fair Conditions

Fair Condition	Study Intersections		Study Area	
	Count	Percent	Count	Percent
Clear or Cloudy Weather	529	82%	3,631	80%
Dry Road Surface	498	78%	3,331	73%
Daylight	397	62%	3,016	66%

There are several ODOT Safety Priority Index System (SPIS) sites in the study area, see Appendix B. SPIS scores are based on three years of crash data[2]. To avoid the over-representation of a crash at a location, SPIS scores over multiple years should be compared. Table 2 lists locations that are identified multiple times as a top five and ten percent for analysis

[1] *Marion County Transportation Safety Action Plan*
[2] *Safety Priority Index System (SPIS), Oregon Adjustable Safety Index (OASIS), and Crash Summary Reports (CSR) System User Guide*

years 2017-2018 and 2022. As noted in the table, all five of the reoccurring SPIS site locations are at intersections with four of them being study intersections.

Table 2: Top 5% and 10% SPIS Sites in the Study Area

	Road*	Brooklake	Ehlen	OR 214	OR 213	OR 214
	Study Intersection	**#21-C** I-5 NB Ramp/ Brooklake Rd	**#12-C** I-5 SB Ramp/ Ehlen Rd	**#n/a** *(OR 214/Elliott Prairie Rd NE)*	**#14** OR 213/Mt Angel Scotts Mill Rd	**#15** OR 214/ Cascade Highway SE
2017 **	**ADT**	-	-	-	**5,201**	1,682
	%	-	-	-	**95*****	90
	Score	-	-	-	**61.63**	52.53
	Crash	-	-	-	**12**	6
	Fatal & A	-	-	-	**1**	1
2018	**ADT**	9,600	11,800	-	4,833	**1,600**
	%	90	90	-	90	**95*****
	Score	56.94	55.16	-	56.37	**63.29**
	Crash	12	18	-	10	**9**
	Fatal & A	1	0	-	1	**1**
2019	**ADT**	9,300	**11,500**	5,944	4,455	1,100
	%	90	**95*****	90	90	95
	Score	51.84	**78.33**	54.8	54.04	63.73
	Crash	10	**23**	10	9	8
	Fatal & A	1	**1**	1	1	1
2022	**ADT**	-	-	5,944	4,244	-
	%	-	-	90	90	-
	Score	-	-	48.92	58.62	-
	Crash	-	-	8	12	-
	Fatal & A	-	-	1	1	-

**Mile Points (MP) for SPIS segments in order, left to right: Brooklake (263.48-263.63), Ehlen (278.63-278.72), OR 214 (41.44-41.58), OR 213 (24.68-24.88), and OR 214 (15.5-15.69)*

***The calculation of SPIS calculation differs as it includes property damage only (PDO)*

**** Bolded values associated with 5% SPIS sites*

Table 3 shows the crash and year summary for the analyzed study intersections. Rear-ends, angle, or turning collisions at intersections were the most represented crash types. Overall, the number of crashes has remained steady over the analyzed period.

The northbound and southbound ramps of I-5 and Ehlen Road accounted for 33% of all rear-ends and 27% of all study intersection crashes. The ramps at this interchange experience significant

congestion due to long-haul truck amenities and previous roadway geometry. A new interchange configuration is currently in construction and projected to be completed in 2027[3].

Table 3: Study Intersection Crash Type and Year Table

Crash Type	2017 Count (%)	2018 Count (%)	2019 Count (%)	2022 Count (%)	Total Count & %	Fatal/ Injury A
Miscellaneous	**1** (1%)	0 (0%)	**1** (1%)	**1** (1%)	3	0
Backing	0 (0%)	0 (0%)	**1** (1%)	**1** (1%)	2	0
Pedestrian	0 (0%)	**1** (1%)	0 (0%)	**1** (1%)	2	2
Angle	**21** (14%)	**32** (19%)	**28** (17%)	**25** (16%)	106	9
Head-on	**2** (1%)	**3** (2%)	0 (0%)	**3** (2%)	8	2
Rear-End	**56** (37%)	**61** (36%)	**54** (34%)	**59** (37%)	230	1
Sideswipe Meeting*	**2** (1%)	**3** (2%)	**2** (1%)	**3** (2%)	10	1
Sideswipe Overtaking	**4** (3%)	**4** (2%)	**9** (6%)	**4** (3%)	21	1
Turning	**43** (28%)	**47** (28%)	**47** (29%)	**47** (29%)	184	4
Parking	**2** (1%)	**1** (1%)	0 (0%)	0 (0%)	3	0
Non-Collision	0 (0%)	**1** (1%)	**2** (1%)	**2** (1%)	5	1
Object (Fixed)	**22** (14%)	**15** (9%)	**17** (11%)	**14** (9%)	68	9
Subtotal:	**153**	**168**	**161**	**160**	**642**	**30**

**Sideswipe-meeting are collisions of two vehicles traveling in the opposite directions that are not a head-on crash.*

There were 30 reported fatalities and severe injuries (type A) at the study intersections. Of these, 17% occurred during typical morning commuting hours (6-9 AM) and 40% during typical evening commuting hours (3-6 PM). Most (88%) crashes with reported speed limits[4] occurred on high-speed routes, >=55 MPH. Approximately 30% of crashes were roadway departures with collisions with a fixed object.

The 30 crashes with fatalities or severe injuries occurred at 19 locations and are detailed below:

Golf Club Rd/Sublimity Rd – One crash with a fatality and three with serious injuries

All four crashes were angle collisions due to not yielding right-of-way or passing a stop sign. Three were mid-morning and one in the afternoon. These crashes all occurred on clear or cloudy days on dry pavement.

I-5 NB Ramp/Ehlen Rd – Two crashes with a fatality and two with serious injuries

All four crashes occurred on clear or cloudy days.

- Around midnight, a head-on collision due to a vehicle going the wrong way
- One night, a pedestrian fatality due to the pedestrian illegally in the roadway
- One a morning, a sideswiping (overtaking) collision occurred due to careless driving.
- One afternoon, a rear-end collision due to following too closely

[3] *ODOT project K22505 "Aurora-Donald Interchange Phase 2"*

[4] All crash records include time, date, crash type, number of persons suspected involved and severity of injury, but may not have all other data fields complete

OR 213/Mt Angel Scotts Mill Rd – Three crashes with serious injuries

All three crashes occurred on clear days on dry pavement.

- One morning, a head-on collision due to improper driving
- One afternoon, a turning collision due to not yielding right-of-way
- One afternoon, a vehicle drove off into a ditch due to a vehicle indirectly involved in the crash.

French Prairie Rd/McKay Rd – Two crashes with serious injuries

Both crashes were angle collisions on clear days on dry pavement.

- One mid-morning, due to careless driving
- One afternoon, due to inattention

OR 214/Cascade Highway SE – Two crashes with serious injuries

Both crashes were angle collisions due to not yielding right-of-way.

- One in the morning on a clear day on dry pavement.
- One in the afternoon on a cloudy day on wet pavement.

OR 99E/Howell Prairie Rd NE – One crash with a fatality and one with serious injuries

- One night, a ped was injured due to the pedestrian illegally in the roadway. It was a clear day and the pavement was dry.
- One morning, a turning collision due to inappropriate speed for the conditions. It was a cloudy day and the pavement was wet.

Arndt Rd/Airport Rd – One crash with serious injuries

One evening, an angle collision occurred due to the motorist disregarding the traffic signal. It was a cloudy day and the pavement was dry.

Donald Rd/Yergen Rd – One crash with a fatality

One afternoon, a vehicle drove into a utility pole then shrubbery due to speeding. It was a clear day and the pavement was dry.

Howell Prairie Rd/Labish Center Rd – One crash with serious injuries

One afternoon, a vehicle drove into a utility pole due to inattention. It was a cloudy day and the pavement was dry.

Howell Prairie Rd/Hazelgreen Rd – One crash with serious injuries

One evening, a vehicle drove into a ditch then overturned due to reckless driving. It was a clear day and the pavement was dry.

I-5 SB Ramp/Ehlen Rd – One crash with serious injuries

One afternoon, a vehicle overturned due to excessive speed for the conditions. It was a clear day and the pavement was dry.

Meridian Rd/Downs Rd/Abiqua Rd – One crash with serious injuries

One evening, a vehicle drove into a ditch due inattention. It was raining and the pavement was wet.

Mt Angel Highway/Hobart Rd – One crash with serious injuries

One afternoon, a turning collision occurred due to not yielding right-of-way. It was a clear day and the pavement was dry.

OR 214/Shaw Highway SE – One crash with serious injuries

One afternoon, a vehicle drove into a ditch due to improper driving. It was a cloudy day and the pavement was wet.

OR 219 (River Rd NE)/McKay Rd – One crash with serious injuries

One night, a vehicle drove through a ditch and into a fence due to a drowsy driver. It was a clear day and the pavement was dry.

OR 99E/Boones Ferry Rd – One crash with a fatality

One evening, a vehicle drove into a ditch and overturned due to excessive speed for the conditions. It was a clear day and the pavement was dry.

Parrish Gap Rd/Delaney Rd – One crash with serious injuries

One morning, a turning collision occurred due to not yielding right-of-way. It was a cloudy day and the pavement was dry.

River Rd/Orville Rd – One crash with serious injuries

One afternoon, a sideswipe, though nearly head-on, collision occurred due to inattention. It was a clear day and the pavement was dry.

Wheatland Rd/ Brooklake – One crash with serious injuries

One evening, a vehicle drove through a ditch into shrubbery due to passing the stop sign. It was a clear day and the pavement was dry.

For the overall study area there were 328 reported fatalities and severe injuries. Of these, 12% occurred during typical morning commuting hours and 31% during typical evening commuting hours. Most (93%) crashes with reported speed limits occurred on high-speed routes. Over 40% of crashes were collisions with fixed objects involving a single vehicle, and of those crashes, 38% of crashes were off roadway collisions.

There were five reported crashes with pedestrian fatalities. Two off I-5, one on OR22 by Idanha, on Lakeside Dr between Labish Village and Labish Center, and one at the intersection of OR99E and Carl Rd north of Woodburn.

There was one reported crash with a cyclist fatality. The collision was due to the motorist's inattention. The crash occurred on a clear day on Lakeside Dr just east of OR 99E.

Crash Type Analysis

Crash types were analyzed to identify over-represented through the excess proportion (EP) of specific crash types method[5]. Half-mile segments were used for this analysis due to side street frequency, and segments with two or less crashes were excluded. Tables 4 and 5 flag segments in the study area and study intersections. Excess proportion suggests the "likelihood that the site will benefit with a countermeasure targeted at the collision type under consideration."[6] Turning and rear end crash types are identified in both segment and intersection analysis as common crash types locations with excess proportions.

[5] Highway Safety Manual (HSM) 2010 4-52
[6] Highway Safety Manual (HSM) 2010 4-58

Table 4 Excess Proportion Flagged 0.5 mile Segments

Crash Type	Road	Mile Points	Reference Population	Crash Count	Probability	Excess Proportion
Object (Fixed)	River Rd S	3.34-3.84	Rural Minor Arterial*	5	1.00	0.68
Turn	OR 99E	34.97-35.47		9	1.00	0.30
	OR 211	1.54-2.04		3	1.00	0.43
Rear	OR 99E	39.91-40.41		6	0.99	0.35
	OR 99E	38.39-38.89		6	0.98	0.28

** Only the Rural Minor Arterial function class/reference population had more than one identified flagged segment*

Table 5 Excess Proportion Flagged Study Intersections

Crash Type	ID	Study Intersection	Ref. Pop.	Crash Count	Prob.	Excess Prop.
Angle	17-C	Boones Ferry Rd/ Ehlen Rd	3ST	8	1.00	0.46
	15	OR 214/Cascade Hwy	4ST	17	1.00	0.44
	16-C	Bents Rd/Ehlen Rd	4SG	2	0.99	0.17
	14-C	Butteville Rd/Ehlen Rd	4ST	8	0.98	0.30
Sideswipe Overtaking	21-C	I-5 NB Ramp/Brooklake Rd	3ST	3	0.96	0.11
Turn	24-C	Golf Club Rd/Sublimity Rd	4ST	10	1.00	0.17
	1	OR 22/ North Fork Rd	4ST	2	1.00	0.30
	14	OR 213/ Mt Angel Scotts Mill Rd	4ST	5	1.00	0.13
	9	Parrish Gap Rd/Delaney Rd	3ST	5	1.00	0.62
	8-C	Witzel Rd/Aumsville Hwy	3ST	3	0.98	0.62
	10	OR 214.Shaw Hwy	3ST	4	0.98	0.42
	21	OR 99E/Quail Street	3ST	4	0.98	0.42
	27	OR 99E/ Howell Prairie Rd NE	3ST	7	0.97	0.26
	36	Arndt Rd/Airport Rd	4SG	14	0.97	0.16
	5	Howell Prairie Rd/Monitor-McKee Rd	3ST	2	0.96	0.62
	22	OR 99E/ Quinaby Rd	3ST	2	0.96	0.62
	19	Mt Angel Highway/Hobart Rd	3ST	3	0.95	0.37
	16-C	Bents Rd/Ehlen Rd	4SG	5	0.95	0.30
	26	OR 99E/ Boones Ferry Rd	3ST	9	0.93	0.15
Rear	25	OR 99E/Waconda Rd	4ST	12	1.00	0.39
	18	OR 551/ Ehlen Rd	4SG	34	1.00	0.19
	6	Howell Prairie Rd/Silverton Rd	AWSC	2	0.99	0.81
	20-C	I-5 NB Ramp/Ehlen Rd	3ST	37	0.99	0.15
	31	OR 99E/Keene Rd	4ST	6	0.99	0.34
	35	OR 551/Arndt Rd	4SG	6	0.99	0.45
	33	OR 219/McKay Rd	3ST	14	0.98	0.22

Crash Type	ID	Study Intersection	Ref. Pop.	Crash Count	Prob.	Excess Prop.
Rear	12	OR 214/ Woodburn-Monitor Rd	3ST	2	0.91	0.55
	3-C	Meridian Rd/Downs Rd/Abiqua Rd	3ST	2	0.91	0.55
	23	OR 99E/ Perkins Street	3ST	3	0.91	0.30

Crash Rate Flagged Segments and Intersections

Critical crash rates were calculated for half mile segments, with more than two crashes, in the study area and at each of the study intersections to flag intersections with an over-representation of crashes, see Tables 6 and 7. These crash rates are compared to their respective reference populations and Statewide Crash Rate tables for segments and published 90th percentile crash ratees for intersections, see Appendix A.

Table 6: Crash Rate Flagged 0.5 Mile Segments

Road	MP	Reference Pop.	FATAL	Inj A	Inj B	Inj C	PDO	CARU Crash Rate[7]	Critical Crash Rate	Critical Crash Rate (Fatal/A)
OR 99E	34.97-35.47	Rural Minor Arterial*	0	0	4	9	6	OVER	Under	Under
OR 214	40.01-40.51		0	1	1	2	4	OVER	Under	Under
OR 214	43.78-44.28		0	0	3	4	1	OVER	Under	Under
OR 164	1.91-2.41		0	1	3	0	4	OVER	OVER	OVER
Airport Rd	3.34-3.84		0	1	1	1	2	OVER	Under	Under

** Only the Rural Minor Arterial function class/reference population had more than one identified segment*

Table 7: Crash Rate Flagged Study Intersections

ID	Study Intersection	Ref. Pop.	FATAL	Inj A	Inj B	Inj C	PDO	State 90% Crash Rate[8]	Critical Crash Rate	Critical Crash Rate (Fatal/A)
9	Parrish Gap Rd/Delaney Rd	3ST	0	1	2	2	1	OVER	Under	Under
10	OR 214/Shaw Highway SE	3ST	0	1	2	1	2	OVER	OVER	Under
12	OR 214/Woodburn-Monitor Rd	3ST	0	0	2	2	3	OVER	Under	Under
13	Battle Creek Rd/Delaney Rd	3ST	0	0	0	0	4	OVER	Under	Under
19	Mt Angel Highway/Hobart Rd	3ST	0	1	1	2	0	OVER	Under	Under
26	OR 99E/Boones Ferry Rd	3ST	1	0	3	10	6	OVER	Under	Under

[7] https://www.oregon.gov/odot/Data/Documents/Crash_Rate_Table_II_2018-2022.pdf
[8] Analysis Procedures Manual, Chapter 4, Exhibit 4-1

ID	Study Intersection	Ref. Pop.	FATAL	Inj A	Inj B	Inj C	PDO	State 90% Crash Rate[8]	Critical Crash Rate	Critical Crash Rate (Fatal/ A)
27	OR 99E/Howell Prairie Rd NE	3ST	1	1	2	4	3	OVER	Under	Under
33	OR 219/McKay Rd	3ST	0	1	3	6	14	OVER	Under	Under
34	River Rd/Orville Rd	3ST	0	1	0	2	4	OVER	Under	Under
7-C	Wheatland Rd/Brooklake Rd	3ST	0	1	2	0	0	OVER	Under	Under
8-C	Witzel Rd/Aumsville Hwy	3ST	0	0	0	3	0	OVER	Under	Under
17-C	Boones Ferry Rd/Ehlen Rd	3ST	0	0	5	6	7	OVER	OVER	Under
19-C	I-5 SB Ramp/Ehlen Rd	3ST	0	1	15	36	33	OVER	OVER	Under
20-C	I-5 NB Ramp/Ehlen Rd	3ST	2	2	14	20	27	OVER	OVER	OVER
21-C	I-5 NB Ramp/Brooklake Rd	3ST	0	2	2	12	5	OVER	Under	Under
22-C	I-5 SB Ramp/Brooklake Rd	3ST	0	0	3	12	7	OVER	Under	Under
14	OR 213/Mt Angel Scotts Mill Rd	4ST	0	3	4	7	6	Under	OVER	OVER
15	OR 214/Cascade Highway SE	4ST	0	2	4	8	5	Under	OVER	OVER
25	OR 99E/Waconda Rd	4ST	0	0	4	13	6	Under	OVER	Under
24-C	Golf Club Rd/Sublimity Rd	4ST	1	3	10	7	6	Under	OVER	OVER
2	Culver Drive/Deer Park Rd	AWSC	0	0	2	4	2	n/a	OVER	Under
32	River Rd/Quinaby Rd	AWSC	0	1	5	10	7	n/a	OVER	Under
18	OR 551/Ehlen Rd	4SG	0	0	10	19	18	OVER	OVER	Under
28	OR 99E/Mt Angel-Gervais Rd	4SG	0	0	5	13	2	OVER	Under	Under
36	Arndt Rd/Airport Rd	4SG	0	1	8	10	10	OVER	OVER	OVER

All the flagged segments and intersections identified in this report are considered safety issue areas, see Table 8 for a summary, and should be further investigated and countermeasures identified. Mile points 1.91-2.41 of OR 164 and study intersections have the most flagged safety concerns. Exhibit 2 examines representative crashes at three of the most flagged locations according to Table 8.

The Marion County TSAP may be a starting point in countermeasure identification. Ultimately, identified countermeasures should be from ODOT's All Road Transportation Safety (ARTS) Program Crash Reduction Factor Manual[9] to streamline future project funding and programming.

[9] https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf

Exhibit 2 – Representative Crashes at most flagged locations

Location Layout	Representative Crash
	On OR 164 at approximately MP 1.92, crash #1739755 occurred on Friday 10/20/2017 around 10 AM in cloudy, daylight conditions. The pavement was wet. The head-on collision of two vehicles occurred despite a double solid yellow centerline in this segment. This segment is in a curve with several driveways to residential and agricultural properties. There are limited gravel shoulders with deep ditches on each side.
	At the signalized intersection of Arndt Rd/Airport Rd, crash #1722447 occurred on Tuesday 3/21/2017 around 4 PM in clear, daylight conditions. The pavement was dry. The collision was due improperly yielding of one of two vehicles going in opposite directions, one turning left and the other straight (Turn Crash). There were no fatalities or serious injuries, but there were at least two possibly injured.
	At stop controlled I-5 NB Ramp/Ehlen Rd off ramp, crash #1729320 occurred on Monday 6/26/2017 around 5 PM in clear, daylight conditions. The pavement was dry. The collision consisted of two vehicles and was due rear-end due to queueing from the off ramp onto Ehlen Rd. There were no fatalities or injuries.

Table 8 Safety Issue Area Summary

ID	Location	Ref. Pop.	CARUC Rate	State 90% Crash Rate	Crit. Crash Rate	Crit. Crash Rate (Fatal/A)	EP Angle Crash	EP Side-swipe, Over-taking	EP Object (Fixed)	EP Turn	EP Rear
n/a	OR 99E (34.97-35.47)	Rural Minor Arterial	✓							✓	
n/a	OR 99E (39.91-40.41)										✓
n/a	OR 99E (38.39-38.89)										✓
n/a	OR 211 (1.54-2.04)									✓	
n/a	OR 214 (40.01-40.51)		✓								
n/a	OR 214 (43.78-44.28)		✓								
n/a	OR 164 (1.91-2.41)		✓		✓	✓					
n/a	Airport Rd (3.34-3.84)		✓								
n/a	River Rd S (3.34-3.84)								✓		
1	OR 22/ North Fork Rd	4ST								✓	
2	Culver Drive/Deer Park Rd	AWSC			✓						
5	Howell Prairie Rd/Monitor-McKee Rd	3ST								✓	
6	Howell Prairie Rd/Silverton Rd	AWSC									✓
9	Parrish Gap Rd/Delaney Rd	3ST		✓						✓	
10	OR 214/Shaw Highway SE	3ST		✓	✓					✓	
12	OR 214/Woodburn-Monitor Rd	3ST		✓							✓
13	Battle Creek Rd/Delaney Rd	3ST		✓							
14	OR 213/Mt Angel Scotts Mill Rd	4ST			✓	✓				✓	
15	OR 214/Cascade Highway SE	4ST			✓	✓	✓				
18	OR 551/Ehlen Rd	4SG		✓	✓						✓
19	Mt Angel Highway/Hobart Rd	3ST		✓						✓	
21	OR 99E/Quail Street	3ST								✓	
22	OR 99E/ Quinaby Rd	3ST								✓	
23	OR 99E/ Perkins Street	3ST									✓
25	OR 99E/Waconda Rd	4ST			✓						✓
26	OR 99E/Boones Ferry Rd	3ST		✓						✓	
27	OR 99E/Howell Prairie Rd NE	3ST		✓						✓	
28	OR 99E/Mt Angel-Gervais Rd	4SG		✓							
31	OR 99E/Keene Rd	4ST									✓
32	River Rd/Quinaby Rd	AWSC			✓						
33	OR 219/McKay Rd	3ST		✓							✓
34	River Rd/Orville Rd	3ST		✓							
35	OR 551/Arndt Rd	4SG									✓
36	Arndt Rd/Airport Rd	4SG		✓	✓	✓				✓	
3-C	Meridian Rd/Downs Rd/Abiqua Rd	3ST									✓
7-C	Wheatland Rd/Brooklake Rd	3ST		✓							
8-C	Witzel Rd/Aumsville Hwy	3ST		✓						✓	
14-C	Butteville Rd/Ehlen Rd	4SG					✓				
16-C	Bents Rd/Ehlen Rd	3ST					✓			✓	
17-C	Boones Ferry Rd/Ehlen Rd	3ST		✓	✓		✓				
19-C	I-5 SB Ramp/Ehlen Rd	3ST		✓	✓						
20-C	I-5 NB Ramp/Ehlen Rd	3ST		✓	✓	✓					✓
21-C	I-5 NB Ramp/Brooklake Rd	3ST		✓				✓			
22-C	I-5 SB Ramp/Brooklake Rd	3ST		✓							
24-C	Golf Club Rd/Sublimity Rd	4ST			✓	✓				✓	

Marion County

Transportation Safety Action Plan

Appendix D: Public Involvement Summary

PUBLIC INVOLVEMENT SUMMARY

PUBLIC INVOLVEMENT AND COMMUNICATIONS PLAN

Through a collaborative process, Marion County and DKS Associates will develop a Transportation Safety Action Plan (TSAP) that will guide the County's investments in transportation safety and will ultimately save lives. The plan will identify goals and strategies necessary to create and maintain a transportation system that safely serves all transportation users in Marion County. The TSAP will additionally provide a framework for future opportunities through State and Federal funding programs.

The Public Involvement and Communications Plan (PICP) for the County TSAP highlights the importance of public outreach, key messages, key audiences, goals, tactics, and tools that will be used for this effort.

OUTREACH GOALS

The primary goals of our outreach efforts will be the following:

- Educate users of the transportation network as to the purpose and need for the TSAP to improve safety.
- Provide multiple channels for people to access information about the TSAP and provide meaningful engagement opportunities.
- Document comments, concerns, and recommendations from the community.
- Incorporate feedback received into the development of the TSAP.

KEY MESSAGES

- The County is committed to improving safety and reducing the risk of fatal and serious injury crashes in Marion County.
- This TSAP is focused on rural roadways and County-owned roadways within small cities (excluding roadways within the Salem-Keizer city limits).
- Data is only one piece of the puzzle – we need to hear from those traveling on Marion County roads to fully understand safety needs and concerns.
- Community outreach efforts will focus on engaging with those who have been historically left out of public planning through trilingual versions of the advertisement flyers.

KEY STAKEHOLDERS

Marion County staff will identify, and coordinate directly with, key stakeholders that have a vested interest in transportation safety. DKS shall attend up to three stakeholder meetings that are facilitated by County staff. The following list identifies potential groups of stakeholders that the County could consider.

- Public works staff from small cities and rural communities
- Rural fire districts
- Marion County Sheriff's office
- Rural transit service providers
- School districts
- Bicycle and pedestrian advocacy groups
- Business and organizations associated with rural tourism (e.g., wineries, farmstands, nurseries, The Oregon Garden, The Enchanted Forest, etc.)
- Representatives for State and County parks

STRATEGIES & TACTICS

We have identified several strategies to reach the widest possible audience in the most effective manner possible. These include utilization of online and social media, collaboration with key stakeholders, and interactive meetings. They are as follows:

PROJECT WEBSITE AND ONLINE SURVEYS

Marion County has overall good access to internet with 95% of households owning a computer and 89% having access to broadband internet[1] – designating that a project website and online surveys are a viable resource to reach the target community. DKS will develop a project website that includes:

- Project information and purpose of the Plan
- Schedule of all meetings and opportunities for community engagement
- All presentations and materials produced for public meetings and workshops
- All final materials produced for the Plan
- Online surveys
- Social pinpoint map (interactive online comment capture)
- Project team contact information

[1] Census QuickFacts, https://www.census.gov/quickfacts/fact/table/marioncountyoregon,US/PST045222

VITURAL OPEN HOUSE EVENTS

DKS will host two virtual Open House events via the project website, including an interactive comment map for gathering community input. The interactive online comment capture will be available for use during virtual outreach efforts and also during in-person events.

The virtual Open House events will be an essential component of collecting community feedback to identify rural roadway safety concerns and the community's safety goals. The success of these is dependent upon capturing attention for the project and engaging a diverse group of participants. This goal will be achieved by engaging in several different mediums of alerting the public of this outreach effort to include social media efforts, the project website, and advertisement flyers of in-person meetings. In-person meetings materials will be prepared by the County and the County will facilitate and lead any in-person events.

MEDIA ADVERTISEMENTS

DKS will develop two advertisement flyers promoting the process, upcoming meetings, and opportunities for participation. The project team will develop the advertisement flyers and make them available in English, Spanish, and Russian. This information will be provided to Marion County to distribute.

LOCAL AGENCY PARTNERS

Over the course of the project the County will provide content to cities within Marion County to share on their websites and social media pages. This will include:

- Promote website launch
- Promote upcoming workshops
- Provide information regarding the Plan process
- Promote opportunities to review proposed strategies and Plan documents

SUMMARY OF KEY THEMES

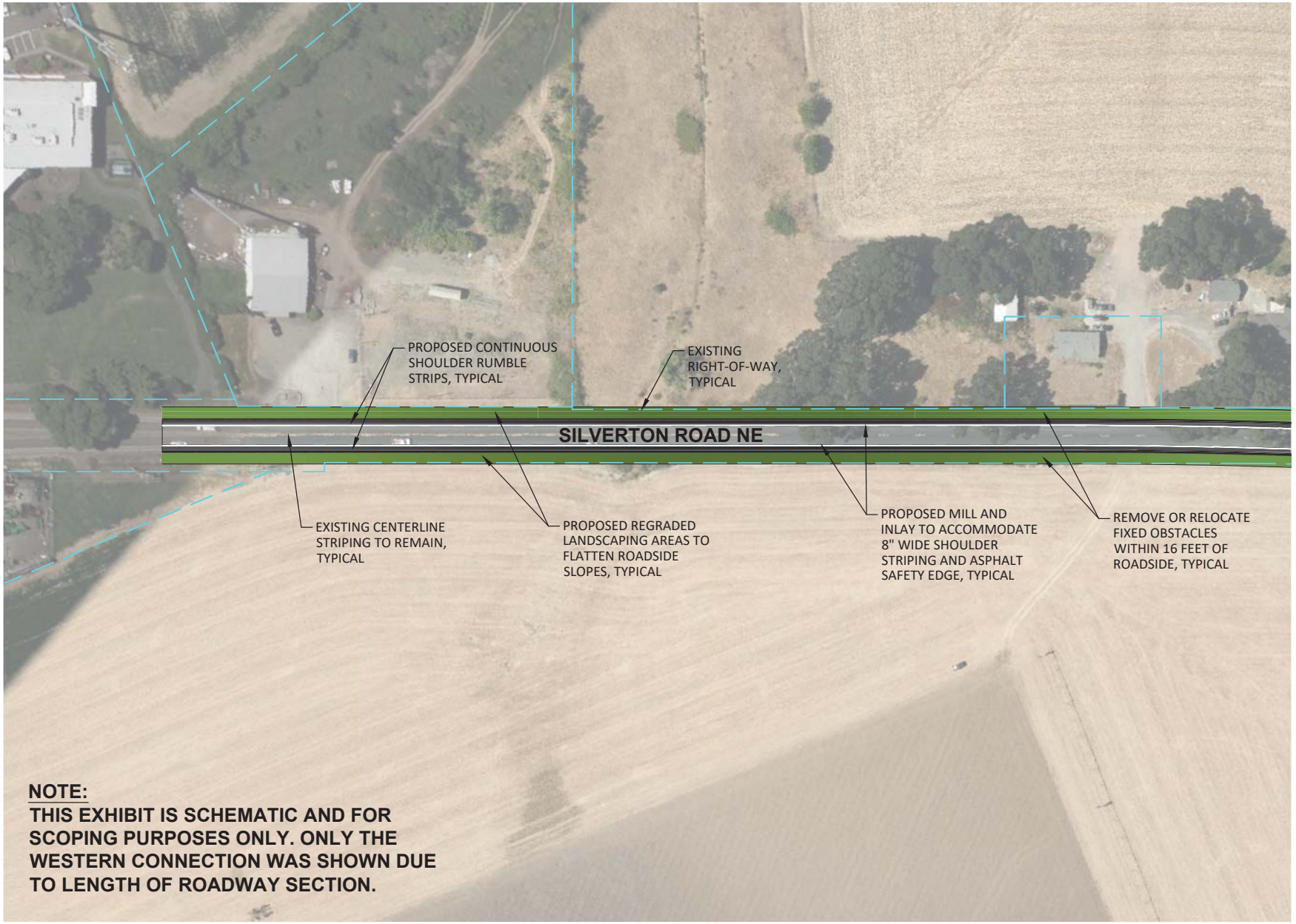
Overall, 37 comments were documented during the in-person events and 144 comments were received via the interactive online comment map. The community input collected across all engagement tools highlighted several key themes regarding transportation safety and infrastructure in Marion County, including:

- **Risky Behaviors**: Community members emphasized concerns about risky driving behaviors commonly leading to near-miss crashes, particularly speeding and aggressive driving. High-speed traffic on roads like McKay Road/Ehlen Road, Silverton Road, and French Prairie Road was noted as particularly dangerous.
- **Road Conditions**: Multiple concerns were raised about quality of pavement, signs, and stripes. Lane and road departure was also a key concern; the need for medians and wider shoulders was stressed.
- **Intersection Safety**: Many of the near-misses experiences shared were related to an intersection, particularly on high-speed roadways like Cordon Road, McKay Road/Ehlen Road, and River Road. Requests for left-turn pockets and roadside vegetation maintenance were recurring themes.
- **Bicyclist & Pedestrian Safety**: Many respondents feel unsafe as bicyclists or pedestrians due to the lack of dedicated infrastructure (e.g., sidewalks, bike lanes, wide shoulders) and having to share the road with speeding drivers or drivers who do not give adequate space when passing.

Marion County

Transportation Safety Action Plan

Appendix E: Concept Designs for Select Projects



NOTE:
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SILVERTON ROAD NE CORRIDOR SAFETY EDGE, RUMBLE STRIPS, SIGNING, AND STRIPING

TRANSPORTATION SAFETY ACTION PLAN
MARION COUNTY, OREGON
JUNE, 2025

0 25 50 100
SCALE: 1" = 100'

6.1

Silverton Road NE Corridor (Exhibit 6.1)

Engineer's Estimate - Preliminary Corridor Estimate

Prepared by: Harper Houf Peterson Righellis, Inc.

HHPR Job No. MCO-08

June 6, 2025

Construction Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	L.S.	1	10.0%	$ 660,000
2	Temporary Work Zone Traffic Control	L.S.	1	8.0%	$ 528,000
3	Erosion Control	L.S.	1	2.0%	$ 132,000
4	Construction Staking	L.S.	1	2.0%	$ 132,000
5	Clearing and Grubbing/Removal of Structures and Obstructions	L.S.	1	$ 421,000	$ 421,000
6	General Excavation	CY	13,928	$ 50.00	$ 696,400
7	Cold Plane Pavement Removal, 2 Inches	SY	47,600	$ 5.00	$ 238,000
8	Level 3, 1/2" Dense ACP	TON	7,127	$ 175.00	$ 1,247,225
9	Aggregate Shoulders	TON	1,362	$ 60.00	$ 81,720
10	10 inch Storm Sewer Pipe	LF	6,050	$ 200	$ 1,210,000
11	Permanent Seeding	ACRE	23.3	$ 20,000.00	$ 466,000
12	Topsoil	CY	12,500	$ 80.00	$ 1,000,000
13	Continuous Rumble Strips	MI	15	$ 7,000	$ 105,000
14	Side Street Stop Controlled Intersection Visibility Upgrades	EA	4	$ 10,000	$ 40,000
15	Striping and Signage	L.S.	1	$ 1,093,000	$ 1,093,000
				Construction Subtotal	**$ 8,050,345**
				40% Contingency	$ 3,220,138
				Power Poles Relocation	$ 490,000
				CONSTRUCTION TOTAL	**$ 11,760,483**

Engineering Design

ITEM	DESCRIPTION	TOTAL
1	Administrative Cost (9%)	$ 1,060,000
2	Topographical Survey	$ 600,000
3	Civil Engineering	$ 1,000,000
4	Traffic Engineering	$ 200,000
5	Geotechnical Engineering	$ 80,000
6	Construction Administration	$ 1,400,000
7	Environmental/Cultural Resources Services	$ 80,000
8	TCE Acquistions (194,500 SF)	$ 194,500
9	ROW Services (43 Parcels)	$ 430,000
	ENGINEERING TOTAL	**$ 5,044,500**

Grand Total	**$ 16,804,983**

General Notes and Assumptions:

Clearing and grubbing will mostly consist of shoulder preparation and shifting/relandscaping ditches

General excavation includes shoulder preparation and flattened side slopes

Flattening side slopes was estimated everywhere. Roadside ditch modifications or driveway culvert pipe replacement may be required.

Mill and overlay was utilized 6" in from proposed 11' edgeline and extends to existing edge of asphalt

Existing pavement thickness was assumed to be 6" to estimate asphalt safety edge and shoulder aggregate

ODOT standard drawings were utilized for safety edge and rumble strips

New striping is primarily limited to wide 8" edgelines

TCE and ROW were estimated based on available ROW data, however, ROW services may not be necessary for the proposed improvements.

NOTE:
THIS EXHIBIT IS SCHEMATIC AND FOR SCOPING PURPOSES ONLY. ONLY THE SOUTHERN CONNECTION WAS SHOWN DUE TO LENGTH OF ROADWAY SECTION.

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RIVER ROAD NE CORRIDOR WIDENING, SAFETY EDGE, RUMBLE STRIPS, SIGNING, AND STRIPING

TRANSPORTATION SAFETY ACTION PLAN
MARION COUNTY, OREGON
JUNE, 2025

0 25 50 100
SCALE: 1" = 100'

7.1

River Road NE Corridor (Exhibit 7.1)

Engineer's Estimate - Preliminary Corridor Estimate

Prepared by: Harper Houf Peterson Righellis, Inc.

HHPR Job No. MCO-08

June 6, 2025

Construction Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	L.S.	1	10.0%	$ 1,171,000
2	Temporary Work Zone Traffic Control	L.S.	1	8.0%	$ 937,000
3	Erosion Control	L.S.	1	2.0%	$ 235,000
4	Construction Staking	L.S.	1	2.0%	$ 235,000
5	Clearing and Grubbing/Removal of Structures and Obstructions	L.S.	1	$ 396,000	$ 396,000
6	General Excavation	CY	34,838	$ 50.00	$ 1,741,900
7	Cold Plane Pavement Removal, 2 Inches	SY	23,900	$ 5.00	$ 119,500
8	Level 3, 1/2" Dense ACP	TON	19,983	$ 175.00	$ 3,497,025
9	Aggregate Base/Shoulders	TON	24,451	$ 60.00	$ 1,467,060
10	10 inch Storm Sewer Pipe	LF	5,750	$ 200	$ 1,150,000
11	Permanent Seeding	ACRE	25.7	$ 20,000.00	$ 514,000
12	Topsoil	CY	13,900	$ 80.00	$ 1,112,000
13	Continuous Rumble Strips	MI	21	$ 7,000	$ 147,000
14	Transverse Rumble Strips	EA	20	$ 1,500	$ 30,000
15	Side Street Stop Controlled Intersection Visibility Upgrades	EA	4	$ 10,000	$ 40,000
16	Striping and Signage	L.S.	1	$ 1,486,000	$ 1,486,000
				Construction Subtotal	**$ 14,278,485**
				40% Contingency	$ 5,711,394
				Power Poles Relocation	$ 770,000
				CONSTRUCTION TOTAL	**$ 20,759,879**

Engineering Design

ITEM	DESCRIPTION	TOTAL
1	Administrative Cost (9%)	$ 1,870,000
2	Topographical Survey	$ 650,000
3	Civil Engineering	$ 1,250,000
4	Traffic Engineering	$ 220,000
5	Geotechnical Engineering	$ 80,000
6	Construction Administration	$ 2,500,000
7	Environmental/Cultural Resources Services	$ 80,000
8	TCE Acquistions (215,000 SF)	$ 215,000
9	ROW Services (50 Parcels)	$ 500,000
	ENGINEERING TOTAL	**$ 7,365,000**

Grand Total	**$ 28,124,879**

General Notes and Assumptions:

Clearing and grubbing will mostly consist of shoulder preparation and shifting/relandscaping ditches

General excavation includes shoulder preparation and flattened side slopes

Flattening side slopes was estimated everywhere. Roadside ditch modifications or driveway culvert pipe replacement may be required.

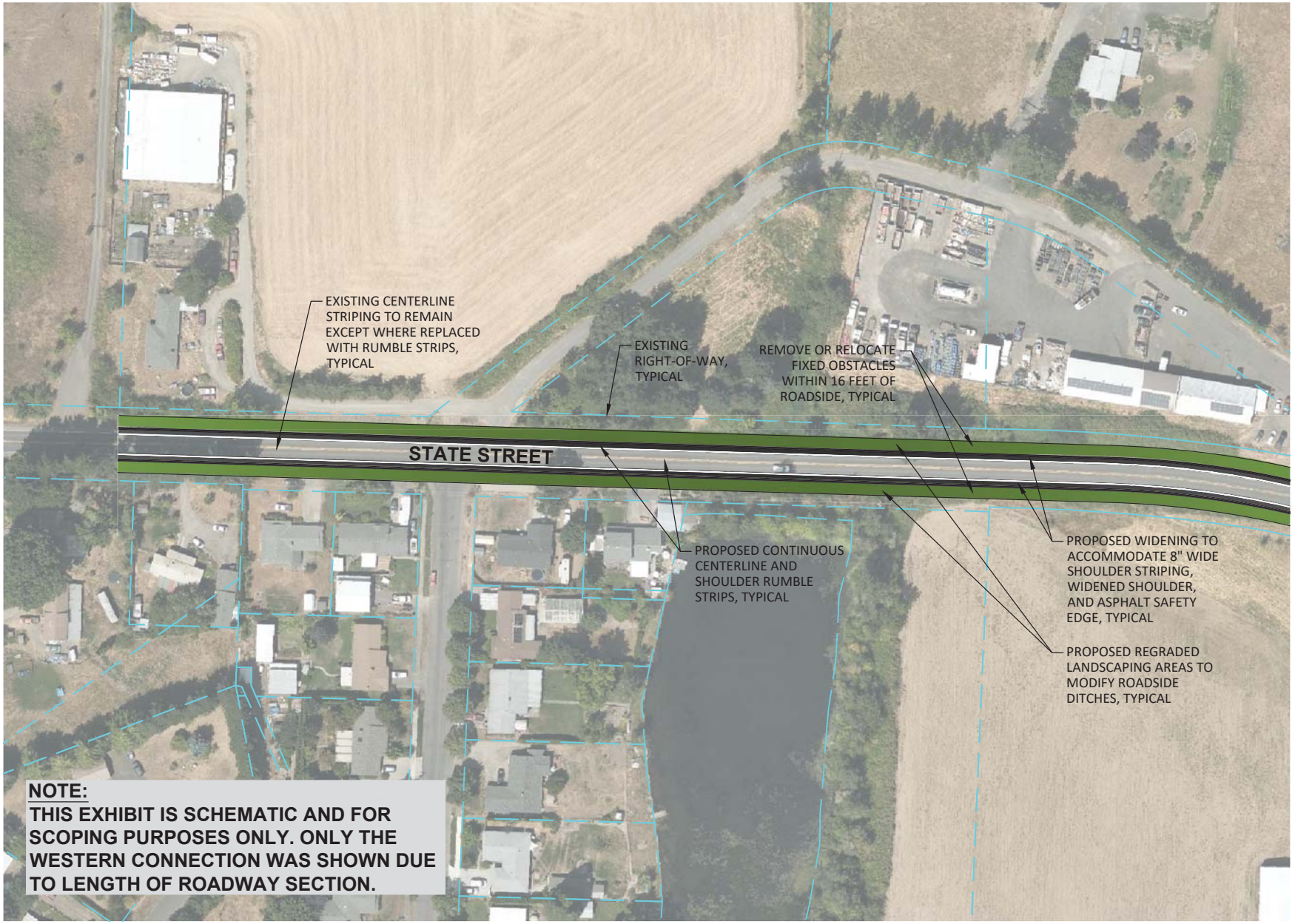
Mill and overlay was utilized 6" in from proposed 11' edgeline and extends to widening sawcut 1' from existing edge

Proposed pavement thickness was assumed to be 8" to estimate asphalt safety edge and shoulder aggregate

ODOT standard drawings were utilized for safety edge and rumble strips

New striping is primarily limited to wide 8" edgelines but includes centerline yellow for left turn lane additions

TCE and ROW were estimated based on available ROW data, however, ROW services may not be necessary for the proposed improvements.



NOTE:
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STATE STREET CORRIDOR WIDENING, SAFETY EDGE, RUMBLE STRIPS, SIGNING, AND STRIPING

TRANSPORTATION SAFETY ACTION PLAN
MARION COUNTY, OREGON
JUNE, 2025

N

0 25 50 100
SCALE: 1" = 100'

8.1

State Street Corridor (Exhibit 8.1)

Engineer's Estimate - Preliminary Corridor Estimate

Prepared by: Harper Houf Peterson Righellis, Inc.

HHPR Job No. MCO-08

June 6, 2025

Construction Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	L.S.	1	10.0%	$ 1,200,000
2	Temporary Work Zone Traffic Control	L.S.	1	8.0%	$ 960,000
3	Erosion Control	L.S.	1	2.0%	$ 240,000
4	Construction Staking	L.S.	1	2.0%	$ 240,000
5	Clearing and Grubbing/Removal of Structures and Obstructions	L.S.	1	$ 515,000	$ 515,000
6	General Excavation	CY	39,211	$ 50.00	$ 1,960,550
7	Cold Plane Pavement Removal, 2 Inches	SY	3,500	$ 5.00	$ 17,500
8	Level 3, 1/2" Dense ACP	TON	23,057	$ 175.00	$ 4,034,975
9	Aggregate Base/Shoulders	TON	32,959	$ 60.00	$ 1,977,540
10	10 inch Storm Sewer Pipe	LF	5,500	$ 200	$ 1,100,000
11	Permanent Seeding	ACRE	20.7	$ 20,000.00	$ 414,000
12	Topsoil	CY	11,100	$ 80.00	$ 888,000
13	Continuous Rumble Strips	MI	17	$ 7,000	$ 119,000
14	Transverse Rumble Strips	EA	40	$ 1,500	$ 60,000
15	Side Street Stop Controlled Intersection Visibility Upgrades	EA	2	$ 10,000	$ 20,000
16	Striping and Signage	L.S.	1	$ 889,000	$ 889,000
				Construction Subtotal	**$ 14,635,565**
				40% Contingency	$ 5,854,226
				Power Poles Relocation	$ 675,000
				CONSTRUCTION TOTAL	**$ 21,164,791**

Engineering Design

ITEM	DESCRIPTION	TOTAL
1	Administrative Cost (9%)	$ 1,910,000
2	Topographical Survey	$ 600,000
3	Civil Engineering	$ 1,200,000
4	Traffic Engineering	$ 200,000
5	Geotechnical Engineering	$ 80,000
6	Construction Administration	$ 2,500,000
7	Environmental/Cultural Resources Services	$ 80,000
8	TCE Acquistions (345,500 SF)	$ 345,500
9	ROW Services (104 Parcels)	$ 1,040,000
	ENGINEERING TOTAL	**$ 7,955,500**

Grand Total	**$ 29,120,291**

General Notes and Assumptions:

Clearing and grubbing will mostly consist of shoulder preparation and shifting/relandscaping ditches

General excavation includes shoulder preparation and flattened side slopes

Flattening side slopes was estimated everywhere except through intersections. Roadside ditch modifications or driveway culvert pipe replacement may be required.

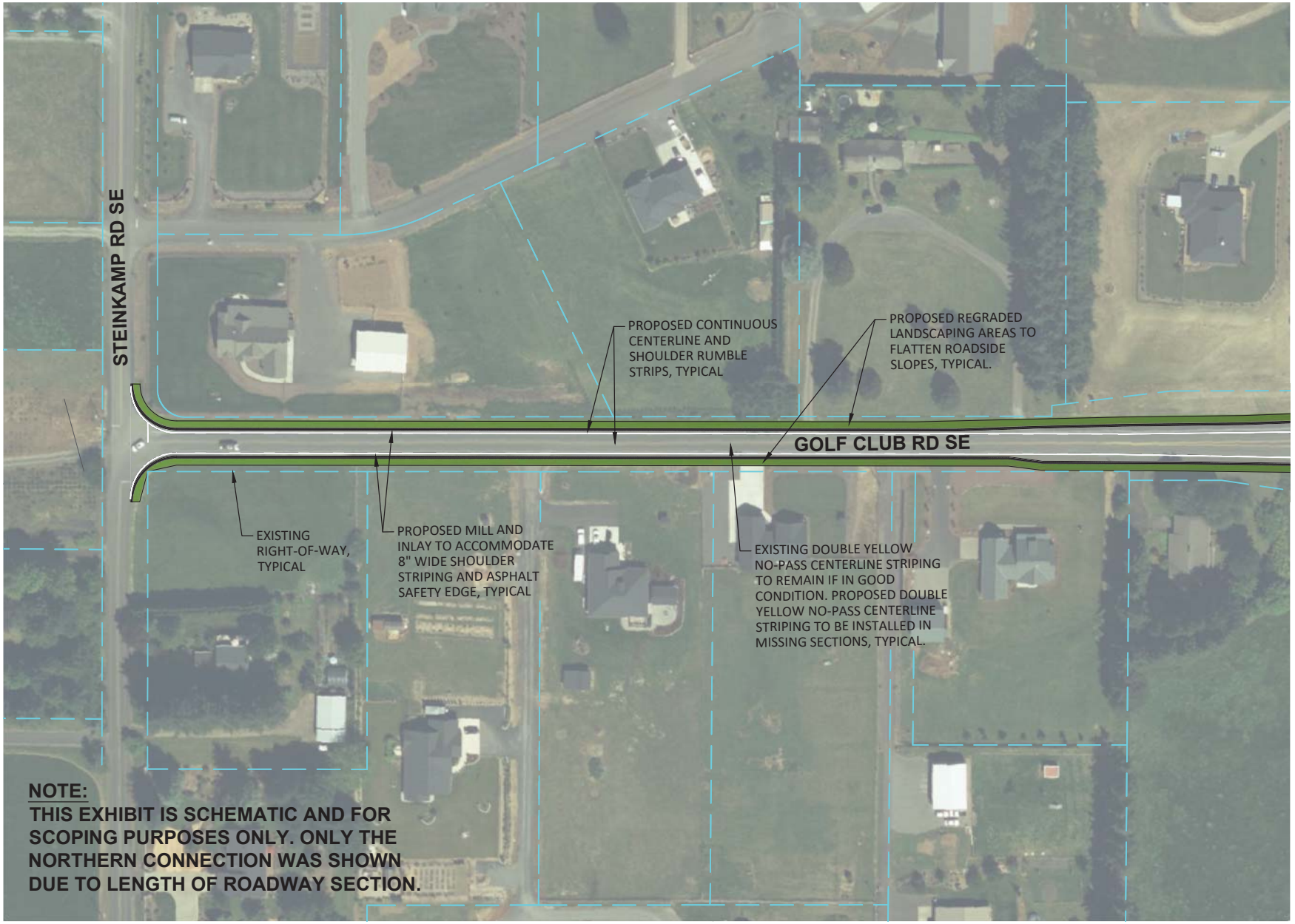
Mill and overlay was utilized for the left turn approach work at Howell Prarie Rd

Proposed pavement thickness was assumed to be 8" to estimate asphalt safety edge and shoulder aggregate

ODOT standard drawings were utilized for safety edge and rumble strips

New striping is primarily limited to wide 8" edgelines but includes centerline yellow for left turn lane additions

TCE and ROW were estimated based on available ROW data, however, ROW services may not be necessary for the proposed improvements.



NOTE:
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GOLF CLUB ROAD CORRIDOR SAFETY EDGE, RUMBLE STRIPS, SIGNING, AND STRIPING

TRANSPORTATION SAFETY ACTION PLAN
MARION COUNTY, OREGON
MAY, 2025

0 25 50 100
SCALE: 1" = 100'

9.1

Golf Club Road Corridor (Exhibit 9.1)

Engineer's Estimate - Preliminary Corridor Estimate

Prepared by: Harper Houf Peterson Righellis, Inc.

HHPR Job No. MCO-08

June 6, 2025

Construction Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	L.S.	1	10.0%	$ 227,000
2	Temporary Work Zone Traffic Control	L.S.	1	8.0%	$ 181,000
3	Erosion Control	L.S.	1	2.0%	$ 46,000
4	Construction Staking	L.S.	1	2.0%	$ 46,000
5	Clearing and Grubbing/Removal of Structures and Obstructions	L.S.	1	$ 111,000	$ 111,000
6	General Excavation	CY	3,695	$ 50.00	$ 184,731
7	Cold Plane Pavement Removal, 2 Inches	SY	13,800	$ 5.00	$ 69,000
8	Level 3, 1/2" Dense ACP	TON	1,955	$ 175.00	$ 342,179
9	Aggregate Shoulders	TON	299	$ 60.00	$ 17,966
10	10 inch Storm Sewer Pipe	LF	1,700	$ 200	$ 340,000
11	Permenant Seeding and Topsoil	SY	30,400	$ 25.00	$ 760,000
12	Continuous Rumble Strips	MI	5.5	$ 7,000	$ 38,500
13	Side Street Stop Controlled Intersection Visibility Upgrades	EA	2	$ 10,000	$ 20,000
14	Striping and Signage	L.S.	1	$ 378,000	$ 378,000
				Construction Subtotal	**$ 2,761,376**
				40% Contingency	$1,104,550
				CONSTRUCTION TOTAL	**$3,865,926**

Engineering Design

ITEM	DESCRIPTION	TOTAL
1	Administrative Cost (9%)	$350,000
2	Topographical Survey	$180,000
3	Civil Engineering	$500,000
4	Traffic Engineering	$100,000
5	Geotechnical Engineering	$50,000
6	Construction Administration	$470,000
7	Environmental/Cultural Resources Services	$50,000
8	TCE Acquistions (12500 SF)	$12,500
9	ROW Services (8 Parcels)	$80,000
	ENGINEERING TOTAL	**$ 1,792,500**

Grand Total	**$ 5,658,426**

General Notes and Assumptions:

Clearing and grubbing will mostly consist of shoulder preparation

General excavation includes shoulder preparation and flattened side slopes

Flattening side slopes was estimated everywhere except through intersections. Roadside ditch modifications or driveway culvert pipe replacement may be required.

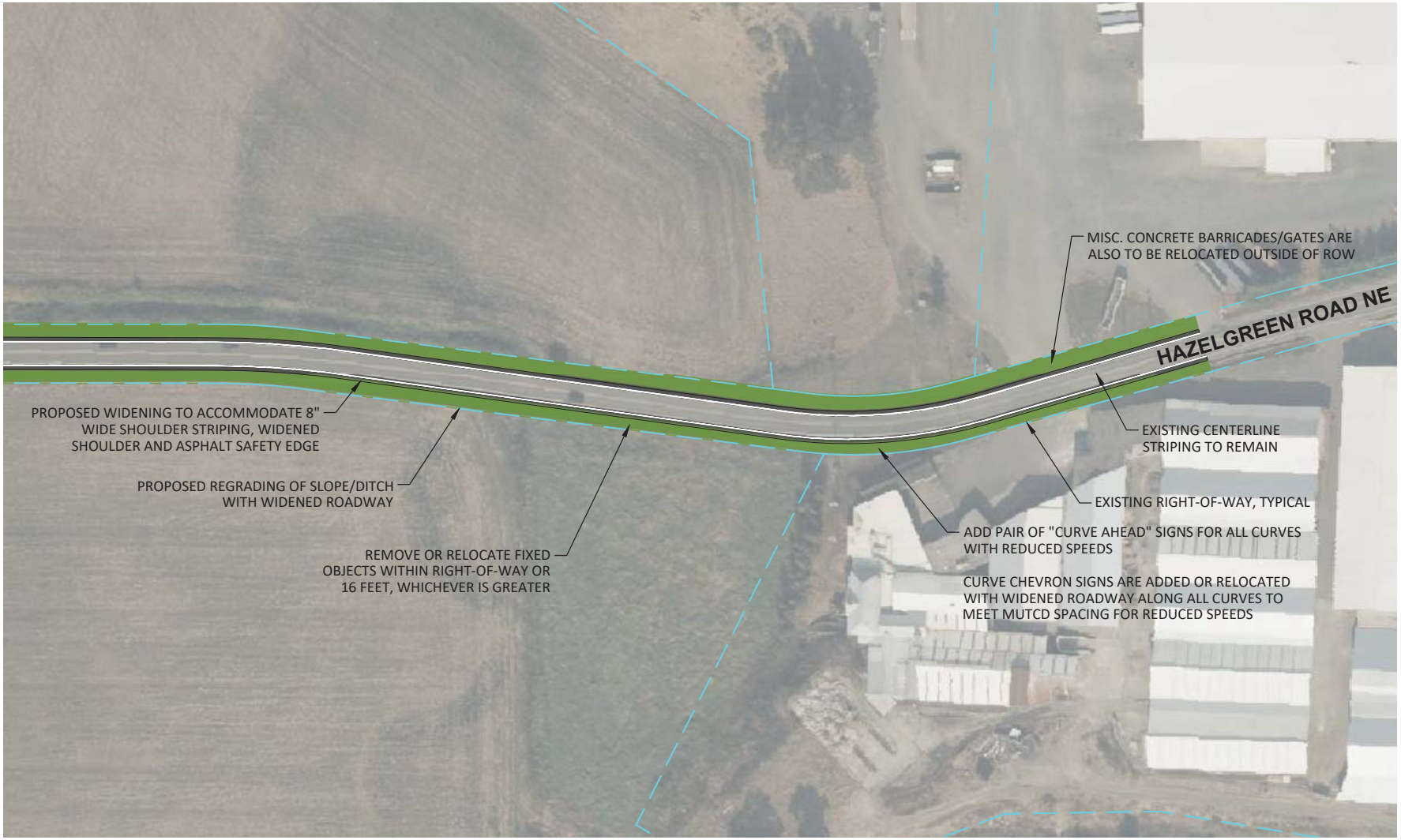
Mill and overlay was utilized 6" in from proposed 11' edgeline and extends to existing edge of asphalt

Existing pavement thickness was assumed to be 6" to estimate asphalt safety edge and shoulder aggregate

ODOT standard drawings were utilized for safety edge and rumble strips

New striping is primarily limited to wide 8" edgelines but includes double yellow (no pass) striping in existing sections without

TCE and ROW were estimated based on available ROW data, however, ROW services may not be necessary for the proposed improvements.



NOTE:

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HAZELGREEN ROAD NE CORRIDOR M.P. 3.0 - 8.0

TRANSPORTATION SAFETY ACTION PLAN
MARION COUNTY, OREGON
JUNE, 2025

0 25 50 100
SCALE: 1" = 100'

11.1

Hazelgreen Road NE Corridor (Exhibit 11.1)

Engineer's Estimate - Preliminary Corridor Estimate

Prepared by: Harper Houf Peterson Righellis, Inc.

HHPR Job No. MCO-08

June 6, 2025

Construction Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	L.S.	1	10.0%	$ 891,000
2	Temporary Work Zone Traffic Control	L.S.	1	8.0%	$ 713,000
3	Erosion Control	L.S.	1	2.0%	$ 179,000
4	Construction Staking	L.S.	1	2.0%	$ 179,000
5	Clearing and Grubbing/Removal of Structures and Obstructions (For wider clear zone)	L.S.	1	$ 440,000	$ 440,000
6	General Excavation	CY	28,634	$ 50.00	$ 1,431,684
7	Level 3, 1/2" Dense ACP	TON	18,130	$ 175.00	$ 3,172,829
8	Aggregate Base and Shoulders	TON	25,574	$ 60.00	$ 1,534,411
9	10 inch Storm Sewer Pipe	LF	3,050	$ 200	$ 610,000
10	Permanent Seeding	ACRE	13	$ 20,000.00	$ 260,000
11	Topsoil (4 inches Deep)	CY	6,551	$ 80.00	$ 524,049
12	Continuous Rumble Strips	MI	11.0	$ 7,000	$ 77,000
13	Transverse Rumble Strips	EA	150	$ 1,500	$ 225,000
14	Side Street Stop Controlled Intersection Visibility Upgrades	EA	2	$ 10,000	$ 20,000
15	Striping	LF	53,060	$ 4	$ 213,000
16	Signage (28 Warning Curve Signs, 70 Chevrons for Curves, 4 dynamic feedback signs)	L.S.	1	$ 398,000	$ 398,000
				Construction Subtotal	**$ 10,867,972**
				40% Contingency	$ 4,347,189
				CONSTRUCTION TOTAL	**$ 15,215,161**

Engineering Design

ITEM	DESCRIPTION	TOTAL
1	Administrative Cost (9%)	$ 1,370,000
2	Topographical Survey	$ 360,000
3	Civil Engineering	$ 800,000
4	Traffic Engineering	$ 160,000
5	Geotechnical Engineering	$ 80,000
6	Construction Administration (12%)	$ 1,830,000
7	Environmental/Cultural Resources Services	$ 250,000
	ENGINEERING TOTAL	**$ 4,850,000**

Grand Total	**$ 20,065,161**

General Notes and Assumptions:

Curve Warning signage is based on existing centerline radius and estimated speeds based on MCO engineering standards and MUTCD signage

Clear zone includes removing or relocating all fixed objects within existing ROW when slopes are recoverable (flatter than 2H:1V slope)

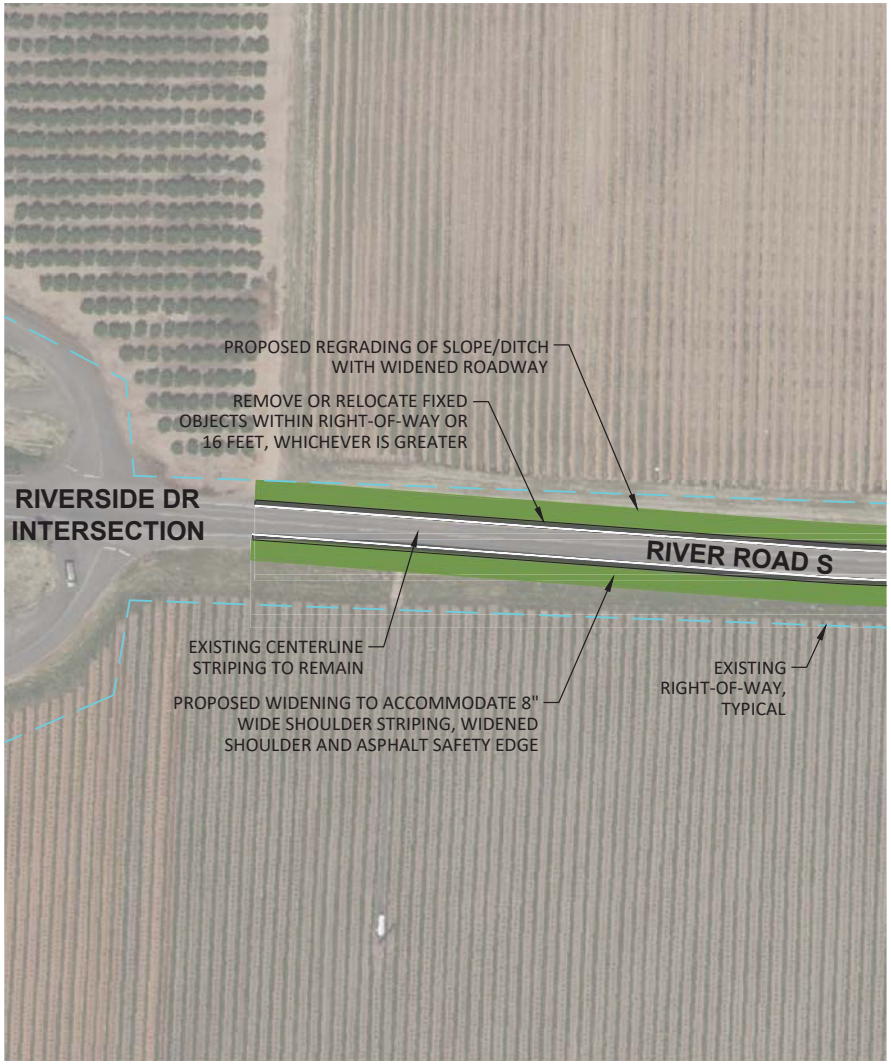
General excavation includes shoulder preparation and flattened side slopes within ROW

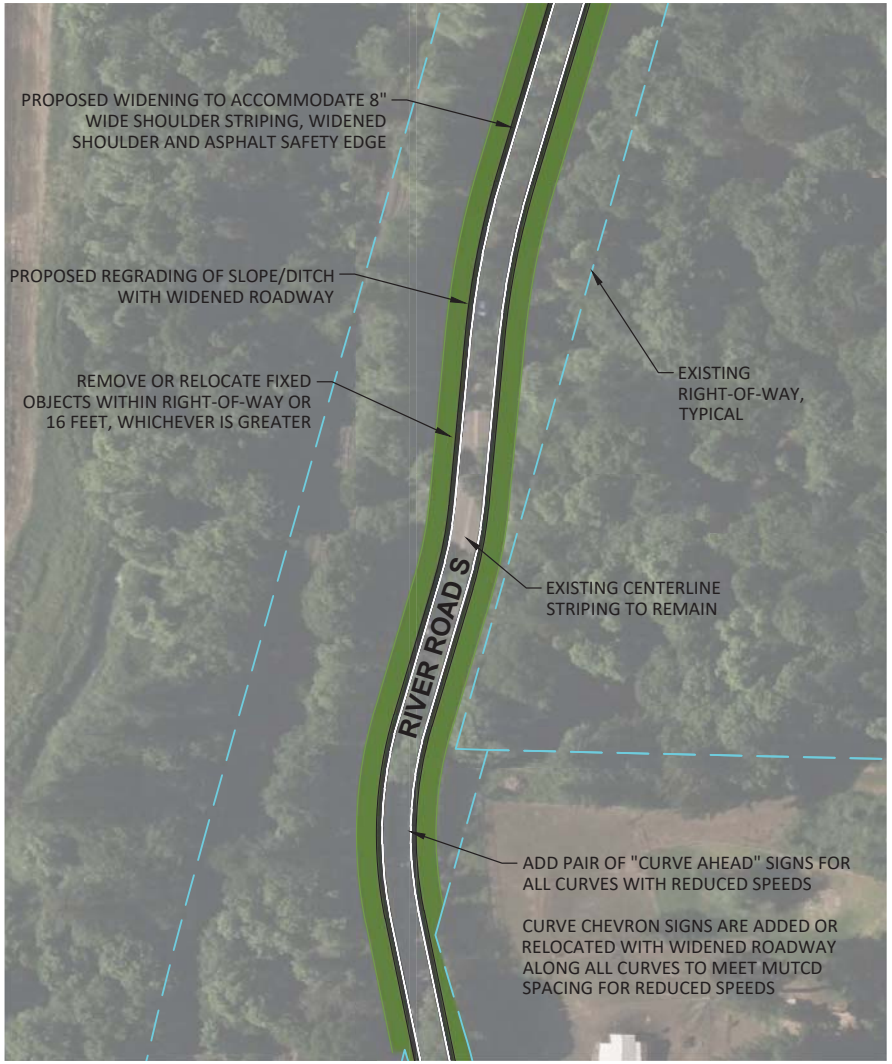
Clear zone crashes include culvert crashes, so slopes around culverts were flattened to provide better recoverable slope

Existing pavement thickness was assumed to be 8" to estimate asphalt safety edge and shoulder aggregate

ODOT standard drawings were utilized for safety edge and rumble strips

All work was assumed to occur in the existing ROW





NOTE:

THIS EXHIBIT IS SCHEMATIC AND FOR SCOPING PURPOSES ONLY. ONLY THE WESTERN CONNECTION AND EXAMPLE CURVES WERE SHOWN DUE TO LENGTH OF ROADWAY SECTION.

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RIVER ROAD S CORRIDOR M.P. 0.0 - 5.0

TRANSPORTATION SAFETY ACTION PLAN

MARION COUNTY, OREGON

JUNE, 2025

N

0 25 50 100

SCALE: 1" = 100'

12.1

River Road S Corridor (Exhibit 12.1)

Engineer's Estimate - Preliminary Corridor Estimate

Prepared by: Harper Houf Peterson Righellis, Inc.

HHPR Job No. MCO-08

June 8, 2025

Construction Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	L.S.	1	10.0%	$ 610,000
2	Temporary Work Zone Traffic Control	L.S.	1	8.0%	$ 488,000
3	Erosion Control	L.S.	1	2.0%	$ 122,000
4	Construction Staking	L.S.	1	2.0%	$ 122,000
5	Clearing and Grubbing/Removal of Structures and Obstructions (For wider clear zone)	L.S.	1	$ 517,000	$ 517,000
6	General Excavation	CY	20,173	$ 50.00	$ 1,008,642
7	Level 3, 1/2" Dense ACP	TON	10,463	$ 175.00	$ 1,830,954
8	Aggregate Base and Shoulders	TON	18,107	$ 60.00	$ 1,086,400
9	10 inch Storm Sewer Pipe	LF	300	$ 200	$ 60,000
10	Permanent Seeding	ACRE	11	$ 20,000.00	$ 220,000
11	Topsoil (4 inches Deep)	CY	5,802	$ 80.00	$ 464,198
12	Continuous Rumble Strips	MI	9.0	$ 7,000	$ 63,000
13	Transverse Rumble Strips	EA	60	$ 1,500	$ 90,000
14	Side Street Stop Controlled Intersection Visibility Upgrades	EA	3	$ 10,000	$ 30,000
15	Striping	LF	47,000	$ 4	$ 188,000
16	Signage (52 Warning Curve Signs, 184 Chevrons for Curves, 4 dynamic feedback signs)	L.S.	1	$ 536,000	$ 536,000
				Construction Subtotal	**$ 7,436,193**
				40% Contingency	$ 2,974,477
				CONSTRUCTION TOTAL	**$ 10,410,670**

Engineering Design

ITEM	DESCRIPTION	TOTAL
1	Administrative Cost (9%)	$ 940,000
2	Topographical Survey	$ 400,000
3	Civil Engineering	$ 700,000
4	Traffic Engineering	$ 120,000
5	Geotechnical Engineering	$ 80,000
6	Construction Administration (12%)	$ 1,250,000
7	Environmental/Cultural Resources Services	$ 250,000
	ENGINEERING TOTAL	**$ 3,740,000**

Grand Total	**$ 14,150,670**

General Notes and Assumptions:

Assume project limits start at Riverside Dr S due at bottom of bridge approach

Curve Warning signage is based on existing centerline radius and estimated speeds based on MCO engineering standards and MUTCD signage

Clear zone includes removing or relocating all fixed objects within existing ROW when slopes are recoverable (flatter than 2H:1V slope)

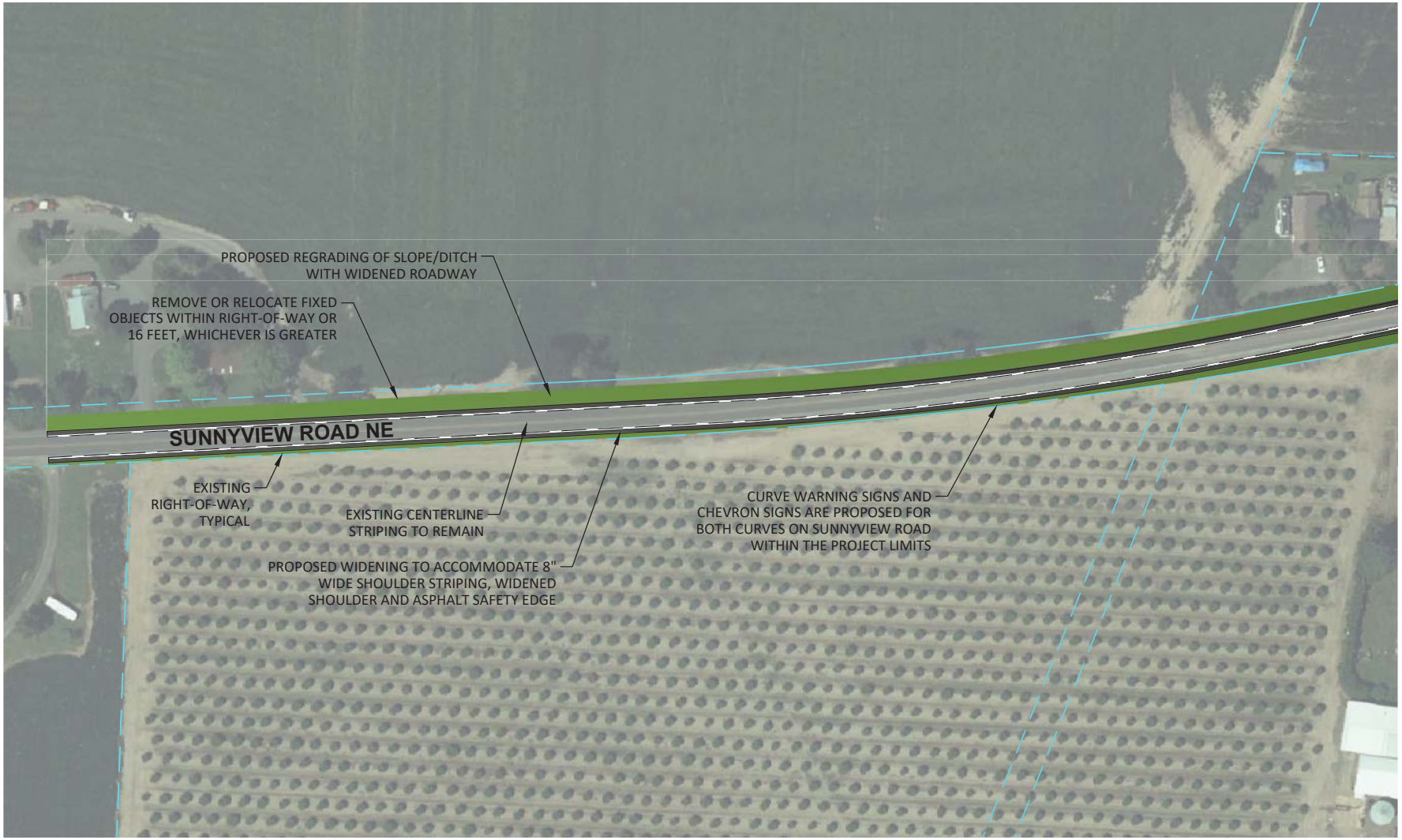
General excavation includes shoulder preparation and flattened side slopes within ROW

Clear zone crashes included railroad bridges, but no changes were proposed for this issue.

Existing pavement thickness was assumed to be 6" to estimate asphalt safety edge and shoulder aggregate

ODOT standard drawings were utilized for safety edge and rumble strips

All work was assumed to occur in the existing ROW



NOTE:

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SUNNYVIEW ROAD NE CORRIDOR M.P. 2.5 - 4.5

TRANSPORTATION SAFETY ACTION PLAN
MARION COUNTY, OREGON
JUNE, 2025

N

0 25 50 100
SCALE: 1" = 100'

13.1

Sunnyview Road NE Corridor (Exhibit 13.1)

Engineer's Estimate - Preliminary Corridor Estimate

Prepared by: Harper Houf Peterson Righellis, Inc.

HHPR Job No. MCO-08

June 8, 2025

Construction Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	L.S.	1	10.0%	$ 194,000
2	Temporary Work Zone Traffic Control	L.S.	1	8.0%	$ 156,000
3	Erosion Control	L.S.	1	2.0%	$ 39,000
4	Construction Staking	L.S.	1	2.0%	$ 39,000
5	Clearing and Grubbing/Removal of Structures and Obstructions (For wider clear zone)	L.S.	1	$ 153,000	$ 153,000
6	General Excavation	CY	7,074	$ 50.00	$ 353,688
7	Level 3, 1/2" Dense ACP	TON	4,083	$ 175.00	$ 714,519
8	Aggregate Base and Shoulders	TON	5,725	$ 60.00	$ 343,525
9	10 inch Storm Sewer Pipe	LF	150	$ 200	$ 30,000
10	Permanent Seeding	ACRE	4	$ 20,000.00	$ 80,000
11	Topsoil (4 inches Deep)	CY	2,119	$ 80.00	$ 169,481
12	Continuous Rumble Strips	MI	3.0	$ 7,000	$ 21,000
13	Striping	LF	13,000	$ 4	$ 52,000
14	Signage (4 Warning Curve Signs, 18 Chevrons for Curves)	L.S.	1	$ 22,000	$ 22,000
				Construction Subtotal	**$ 2,367,213**
				40% Contingency	$ 946,885
				CONSTRUCTION TOTAL	**$ 3,314,099**

Engineering Design

ITEM	DESCRIPTION	TOTAL
1	Administrative Cost (9%)	$ 300,000
2	Topographical Survey	$ 100,000
3	Civil Engineering	$ 200,000
4	Traffic Engineering	$ 60,000
5	Geotechnical Engineering	$ 40,000
6	Construction Administration (12%)	$ 400,000
7	Environmental/Cultural Resources Services	$ 40,000
	ENGINEERING TOTAL	**$ 1,140,000**

Grand Total	**$ 4,454,099**

General Notes and Assumptions:

Curve Warning signage is based on existing centerline radius and estimated speeds based on MCO engineering standards and MUTCD signage

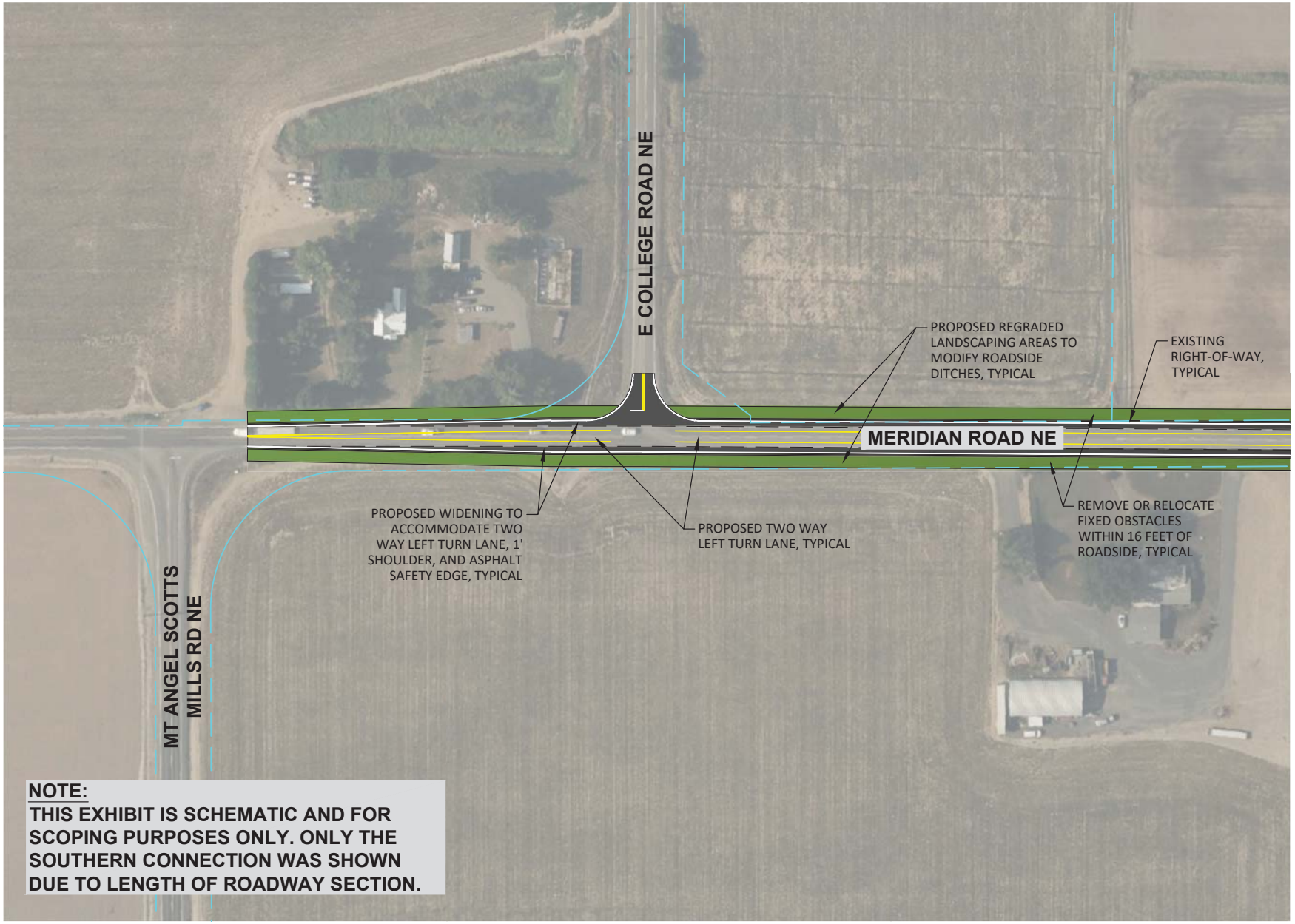
Clear zone includes removing or relocating all fixed objects within existing ROW when slopes are recoverable (flatter than 2H:1V slope)

General excavation includes shoulder preparation and flattened side slopes within ROW

Existing pavement thickness was assumed to be 8" to estimate asphalt safety edge and shoulder aggregate

ODOT standard drawings were utilized for safety edge and rumble strips

All work was assumed to occur in the existing ROW



NOTE:
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MERIDIAN ROAD NE CORRIDOR TWO WAY LEFT TURN LANE, SAFETY EDGE, SIGNING, AND STRIPING

TRANSPORTATION SAFETY ACTION PLAN
MARION COUNTY, OREGON
JUNE, 2025

0 25 50 100
SCALE: 1" = 100'

Meridian Road NE Corridor (Exhibit 14)

Engineer's Estimate - Preliminary Corridor Estimate

Prepared by: Harper Houf Peterson Righellis, Inc.

HHPR Job No. MCO-08

June 6, 2025

Construction Costs

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	Mobilization	L.S.	1	10.0%	$ 295,000
2	Temporary Work Zone Traffic Control	L.S.	1	8.0%	$ 236,000
3	Erosion Control	L.S.	1	2.0%	$ 59,000
4	Construction Staking	L.S.	1	2.0%	$ 59,000
5	Clearing and Grubbing/Removal of Structures and Obstructions	L.S.	1	$ 108,000	$ 108,000
6	General Excavation	CY	9,052	$ 50.00	$ 452,600
7	Level 3, 1/2" Dense ACP	TON	5,503	$ 175.00	$ 963,025
8	Aggregate Base/Shoulders	TON	8,059	$ 60.00	$ 483,540
9	10 inch Storm Sewer Pipe	LF	1,350	$ 200	$ 270,000
10	Permanent Seeding	ACRE	4.1	$ 20,000.00	$ 82,000
11	Topsoil	CY	2,200	$ 80.00	$ 176,000
12	Transverse Rumble Strips	EA	20	$ 1,500	$ 30,000
13	Side Street Stop Controlled Intersection Visibility Upgrades	EA	4	$ 10,000	$ 40,000
14	Striping and Signage	L.S.	1	$ 343,000	$ 343,000
				Construction Subtotal	**$ 3,597,165**
				40% Contingency	$ 1,438,866
				Power Poles Relocation	$ 140,000
				CONSTRUCTION TOTAL	**$ 5,176,031**

Engineering Design

ITEM	DESCRIPTION	TOTAL
1	Administrative Cost (9%)	$ 470,000
2	Topographical Survey	$ 100,000
3	Civil Engineering	$ 200,000
4	Traffic Engineering	$ 80,000
5	Geotechnical Engineering	$ 40,000
6	Construction Administration	$ 625,000
7	Environmental/Cultural Resources Services	$ 40,000
8	TCE Acquistions (99,500 SF)	$ 99,500
9	ROW Services (28 Parcels)	$ 280,000
	ENGINEERING TOTAL	**$ 1,934,500**

Grand Total	**$ 7,110,531**

General Notes and Assumptions:

Clearing and grubbing will mostly consist of shoulder preparation and shifting/relandscaping ditches

Proposed cross section between Marquam and College Road includes 12' wide TWLTL, 11' wide travel lanes, and 1' wide shoulders

General excavation includes widening, shoulder preparation and flattened side slopes

Flattening side slopes was estimated everywhere. Roadside ditch modifications or driveway culvert pipe replacement may be required.

Proposed pavement thickness was assumed to be 8" to estimate asphalt safety edge and shoulder aggregate

ODOT standard drawings were utilized for safety edge

New striping includes TWLTL and 8" wide edgelines

TCE and ROW were estimated based on available ROW data, however, ROW services may not be necessary for the proposed improvements.

Marion County

Transportation Safety Action Plan

Appendix F: Crosswalk of the TSAP Elements and the Safe Streets and Roads for all (SS4A) Components of an Eligible Comprehensive Safety Action Plan

CROSSWALK OF THE TSAP ELEMENTS AND THE SAFE STREETS AND ROADS FOR ALL (SS4A) COMPONENTS OF AN ELIGIBLE COMPREHENSIVE SAFETY ACTION PLAN	
SS4A ELIGIBILITY COMPONENT	**TSAP ELEMENT (PAGE)**
1. LEADERSHIP COMMITMENT AND GOAL SETTING – official public commitment by a high-ranking official and/or governing body to an eventual goal of zero roadway fatalities and serious injuries. The commitment must include a goal and timeline for eliminating roadway fatalities and serious injuries achieved through one, or both, of the following: (1) the target date for achieving zero roadway fatalities and serious injuries, OR (2) a percentage reduction of roadway fatalities and serious injuries by a specific date with an eventual goal of eliminating roadway fatalities and serious injuries.	Chapter 1, Introduction, Our Vision (Page 3)
2. PLANNING STRUCTURE - a committee, task force, implementation group, or similar body charged with oversight of the action plan development, implementation, and monitoring.	Chapter 3, Community Engagement (Page 8)
3. SAFETY ANALYSIS - analysis of existing conditions and historical trends that provides a baseline level of crashes involving fatalities and serious injuries across a jurisdiction, locality, tribe, or region. Includes an analysis of locations where there are crashes and the severity of the crashes, as well as contributing factors and crash types by relevant road users (motorists, people walking, transit users, etc.). Analysis of systemic and specific safety needs is also performed, as needed (e.g., high-risk road features, specific safety needs of relevant road users, public health approaches, analysis of the built environment, demographic, and structural issues, etc.). To the extent practical, the analysis should include all roadways within the jurisdiction, without regard for ownership. Based on the analysis performed, a geospatial identification of higher-risk locations is developed (a high-injury network or equivalent).	Chapter 4, Crash Data Summary (Pages 9-16)
4. ENGAGEMENT AND COLLABORATION - robust engagement with the public and relevant stakeholders, including the private sector and community groups, that allows for both community representation and feedback. Information received from engagement and collaboration is analyzed and incorporated into the action plan. Overlapping jurisdictions are included in the process. Plans and processes are coordinated and aligned with other governmental plans and planning processes to the extent practical.	Chapter 3, Community Engagement (Page 8)
6. POLICY AND PROCESS CHANGES - assessment of current policies, plans, guidelines, and/or standards (e.g., manuals) to identify opportunities to improve how processes prioritize transportation safety. The action plan discusses implementation through the adoption of revised or new policies, guidelines, and/or standards, as appropriate	Chapter 6, Addressing Safety Needs (Pages 44-50)
7. STRATEGY AND PROJECT SELECTIONS – identification of a comprehensive set of projects and strategies, shaped by data, the best available evidence and noteworthy practices, as well as stakeholder input, that will address the safety problems described in the action plan. These strategies and countermeasures focus on a safe system approach, effective interventions, and consider multidisciplinary activities. To the extent practical, data limitations are identified and mitigated. Once identified, the projects and strategies are prioritized in a list that provides time ranges for when the strategies and countermeasures will be deployed (e.g., short-, mid-, and long-term timeframes). The list should include specific projects and strategies, or descriptions of programs of projects and strategies, and explains prioritization criteria used. The list should contain interventions focused on infrastructure, behavioral, and/or operational safety.	Chapter 6, Addressing Safety Needs (Page 19-44)
8. PROGRESS AND TRANSPARENCY - method to measure progress over time after an action plan is developed or updated, including outcome data. Means to ensure ongoing transparency is established with residents and other relevant stakeholders. Must include, at a minimum, annual public and accessible reporting on progress toward reducing roadway fatalities and serious injuries, and public posting of the action plan online.	Chapter 7, Implementation and Monitoring (Page 52) Plan and performance measures will be made available on the County's website.