CLACKAMAS COUNTY BOARD OF COUNTY COMMISSIONERS
Policy Session Worksheet

Presentation Date: 11/20/2018 **Approx. Start Time:** 10:30am **Approx. Length:** 60 minutes

Presentation Title: Transportation Safety Action Plan Update

Department: Department of Transportation and Development, Engineering

Presenters: Joseph Marek, Traffic Safety Program Manager, Mike Bezner Assistant Director

Other Invitees: Philip Mason-Joyner, Operations Manager, Clackamas County Public Health Division; Ellen Rogalin, Community Relations Specialist, Rob Sadowsky, Transportation Safety Outreach Coordinator, Christian Snuffin, Senior Traffic Engineer (DTD).

WHAT ACTION ARE YOU REQUESTING FROM THE BOARD? Placing the Transportation Safety Action Plan (TSAP) on the agenda for the BCC business session agenda for January 24, 2019 for a public hearing and consideration for adoption. This is an opportunity for the Board to review the background, research and data that supports the plan and offer input into the action plan before final adoption.

EXECUTIVE SUMMARY:

The first *Clackamas County Transportation Safety Action Plan* (TSAP) was adopted by the BCC in November of 2012 reflecting the Board's commitment to reducing fatal and serious injury crashes. Transportation safety was further affirmed in the 2015 Clackamas County Strategic Priorities with "Build a strong infrastructure" and "Ensure safe, healthy and secure communities". Additionally, the *Blueprint for a Healthy Clackamas County 2017-2020* identifies a goal of eliminating fatal crashes.

Transportation safety action plans are designed to be updated about every five years and with a grant from the Oregon Department of Transportation – Transportation Safety Division (ODOT-TSD), the County was able to take on this effort. The updated plan includes a review of 2009-2015 crash data and updates the leading crash contributing factors. Since the first TSAP was adopted, there has been a much broader emphasis in the United States regarding efforts to eliminate fatal and serious injury crashes. This updated plan incorporates the most current crash data, research work and lessons learned from around the globe.

The TSAP update includes a summary of crash data, current policies, and review and update of action items based on broad stakeholder and citizen input. Additionally, the new plan includes a Local Road Safety Plan which outlines a prioritized list of safety related projects including systemic treatments across the transportation system and "hot spot" areas for County-owned roads.

The Drive to Zero Advisory Committee and a Traffic Safety Commission member has served as the policy level group reviewing the plan development along with a group focused on technical aspects, citizens and business input. Meetings were primarily with combined groups. Due to wide geographic area of the plan update, outreach was largely via social media and on virtual open house.

Following this meeting, necessary plan changes will be completed and a draft final document prepared. Final adoption is proposed by the Board of County Commissioners via resolution.

FINANCIAL IMPLICATIONS (current year and ongoing):

Is this item in your current budget? ☒ YES ☐ NO

What is the cost? $150,000 for plan What is the funding source? Road, General Fund, and ODOT Grant

Development of the TSAP plan is $150,000 plus staff time. An ODOT-TSD grant funded $77,807.17 of the cost. The remaining cost has been funded by Road Fund and General Fund. Funding for Drive-to-Zero outreach and non-infrastructure efforts will continue via General Fund allocation of $268,686. Infrastructure projects will be funded by Road Fund. The Road Fund has never had a budget line dedicated to safety projects. With the passage of HB2017, a safety project category will be created and funding will increase from $500,000 per year to $1,500,000 once the measure takes full effect. This level of funding will be continuous.

STRATEGIC PLAN ALIGNMENT:

- How does this item align with your Department's Strategic Business Plan goals?
  Safe Roads is one of the Areas of Strategic Focus. "The public's increasing expectation that the transportation system will be safer and support a healthier community."
- How does this item align with the County's Performance Clackamas goals?
  "By 2035, reduce the number of fatalities resulting from crashes on roads in Clackamas County to zero."

LEGAL/POLICY REQUIREMENTS: The TSAP includes a goal of reaching zero fatalities and serious injuries on County roads by 2035, in alignment with the *Oregon Transportation Safety Action Plan 2016*. This goal aligns with the County's *Blueprint for a Healthy Clackamas County 2017-2020*.

PUBLIC/GOVERNMENTAL PARTICIPATION:

DTD has held two public comment meetings, one at the beginning of the project and one in November 2018 after formal draft development. Input from these sessions has been incorporated into the final draft provided. Additionally, DTD conducted a virtual open house in the summer of 2018 with 37 respondents.

Implementation of the TSAP will require a collaborative effort of many County departments in partnership with external partners to achieve Drive to Zero. This includes, but is not limited to: Clackamas County Sheriff's Office, Clackamas County Health, Housing and Human Services, Clackamas Fire, Oregon Impact, Think First, Clackamas Emergency Services, and others.

OPTIONS:

1) To schedule a public hearing for the January 24, 2019 business meeting to consider the TSAP for adoption.
2) Provide direction to staff on revisions to be made to the plan prior to adoption.

RECOMMENDATION:

Staff respectfully recommends Option #1.

ATTACHMENTS: Slide deck, copy of TSAP Part 1 and copy of Drive to Zero Safety Action Plan Part 2 (working draft).

SUBMITTED BY:
Division Director/Head Approval _____
Department Director/Head Approval _____
County Administrator Approval _____

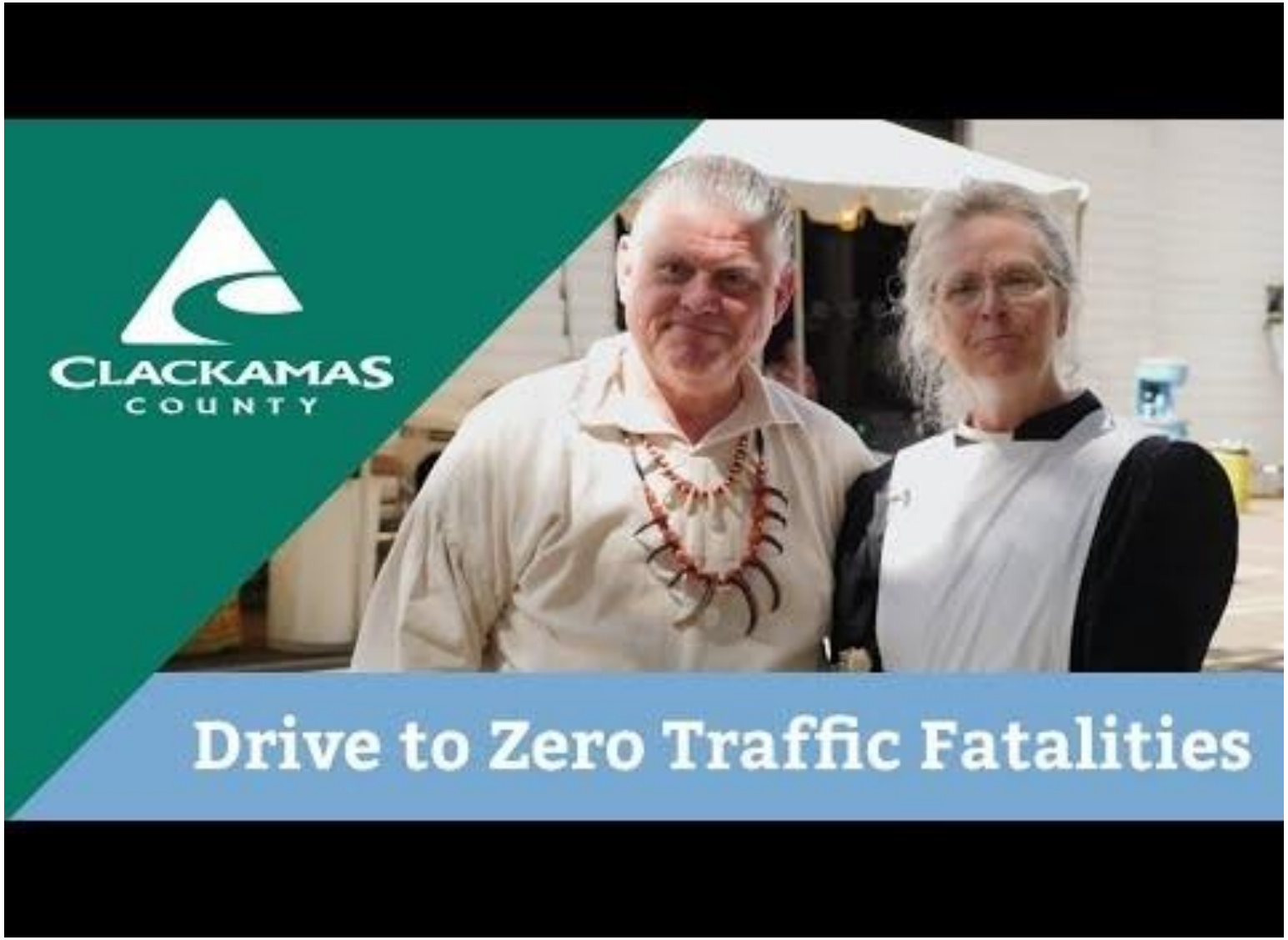
For information on this issue or copies of attachments, please contact _Joe Marek_ @ 503-742-4705___

Transportation Safety Action Plan Update

Clackamas County Department of Transportation and Development

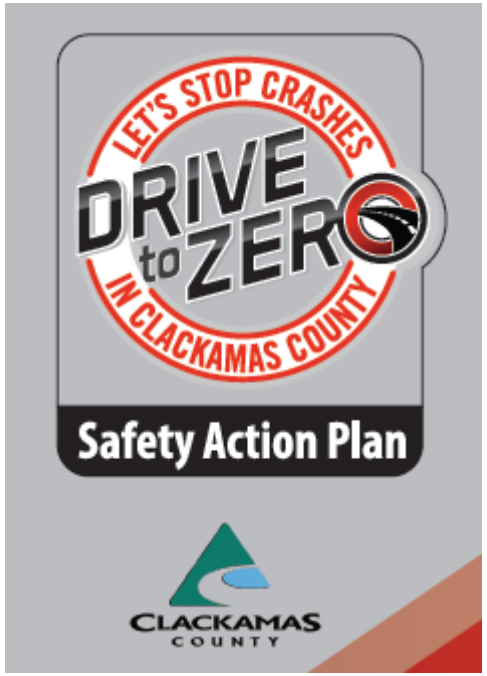
November 20, 2018

How Many Roadway Fatalities Are Acceptable?



Agenda

- Historical timeline
- 2018 TSAP
  - Part 1
  - Part 2
- Next Steps



History

- World Health Organization – 2010
  - 1.3 million killed in vehicle crashes globally
  - 50 million injured

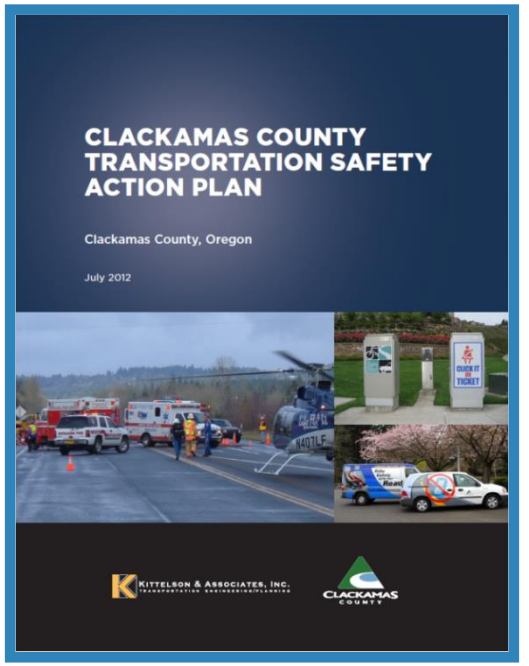
Courtesy of WHO, Department of Violence and Injury Prevention and Disability (www.who.int/violence_injury_prevention)

Decade of Action for Road Safety 2011-2020 proclaimed by governments around the world

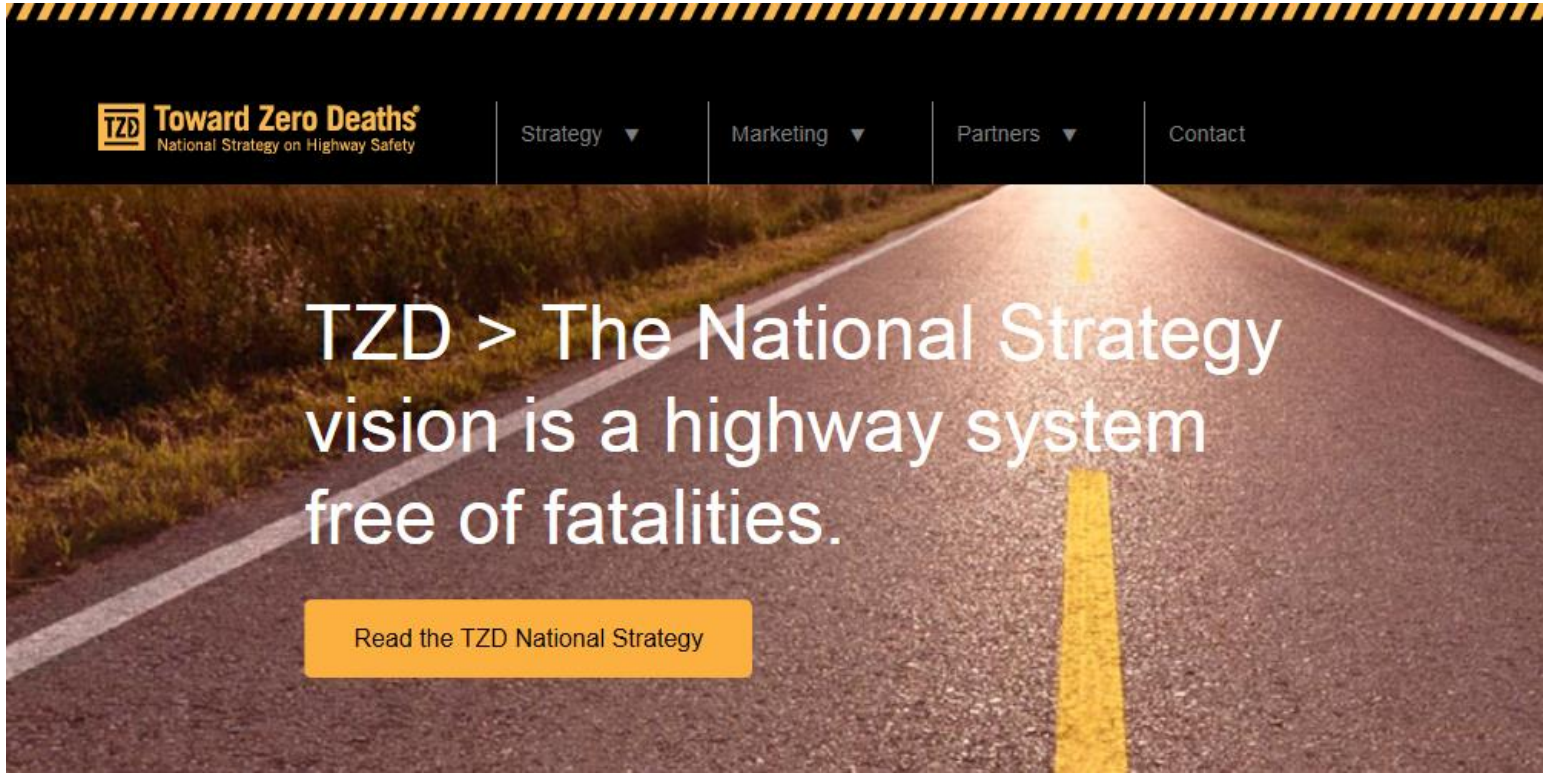
Yesterday governments around the world took the historic decision to increase action to address the road safety crisis over the next ten years. The UN General Assembly resolution proclaiming a Decade of Action for Road Safety 2011-2020 (A/64/L.44/Rev.1) was tabled by the Government of the Russian Federation and cosponsored by more than 90 countries. WHO welcomes this proclamation which seeks to save lives by halting the increasing trends in road traffic deaths and injuries world-wide.

2012 TSAP

"Reduce Fatal and Serious Injury Crashes by 50% by 2020"



2014- Toward Zero Deaths

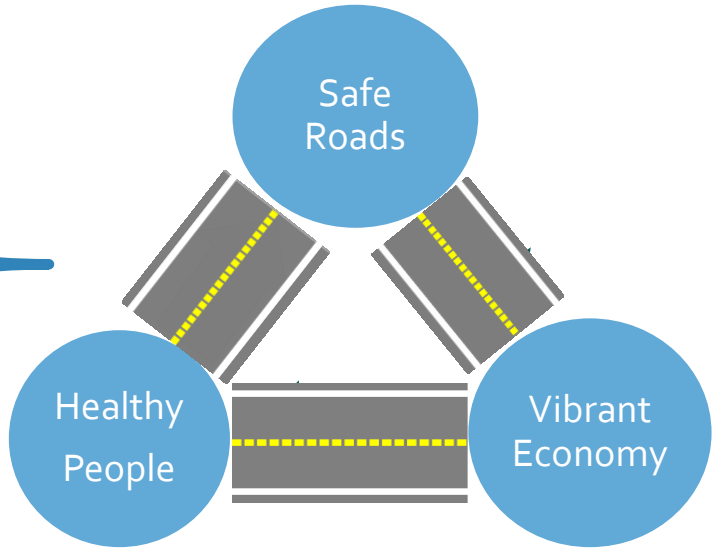


2014-2015

- Oregon DOT reviews system-wide safety using a jurisdictionally blind approach
- Increases the amount of funding to be used on local agency roadways for safety work
- Develops “All Roads Transportation Safety Program” (ARTS)
- Adopts “Systemic” approach to safety improvements – deploy small but proven safety countermeasures across the transportation system

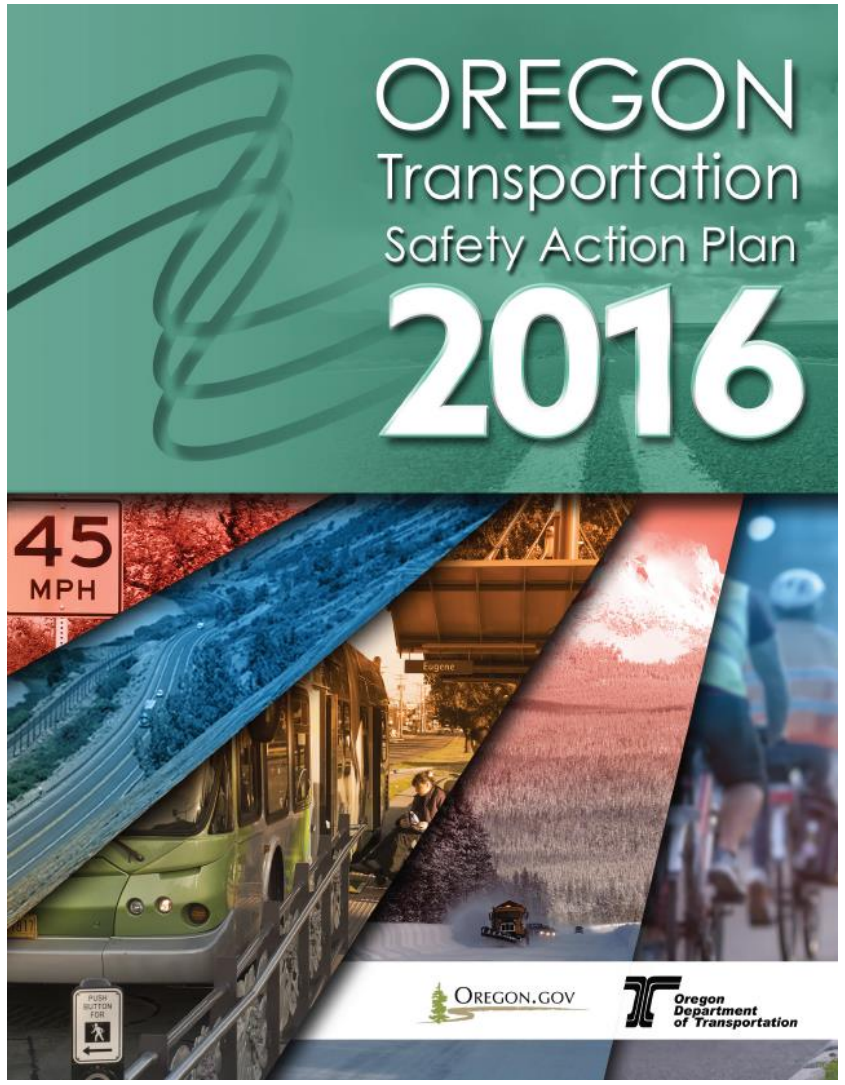
County Strategic Priorities

- Build public trust through good government
- Grow a vibrant economy
- Build a strong infrastructure
- Ensure safe, healthy and secure communities
- Honor, utilize, promote and invest in our natural resources



2016 ODOT Transportation Safety Action Plan

"Eliminate Fatal and Serious Injury Crashes by 2035"



2017 H3S Community Health Improvement Plan

Goals

Eliminate all pedestrian, bicycle and motor vehicle traffic crash fatalities in Clackamas County.

2018 Clackamas County Transportation Safety Action Plan

"**Eliminate** Fatal and Serious Injury Crashes by 2035"

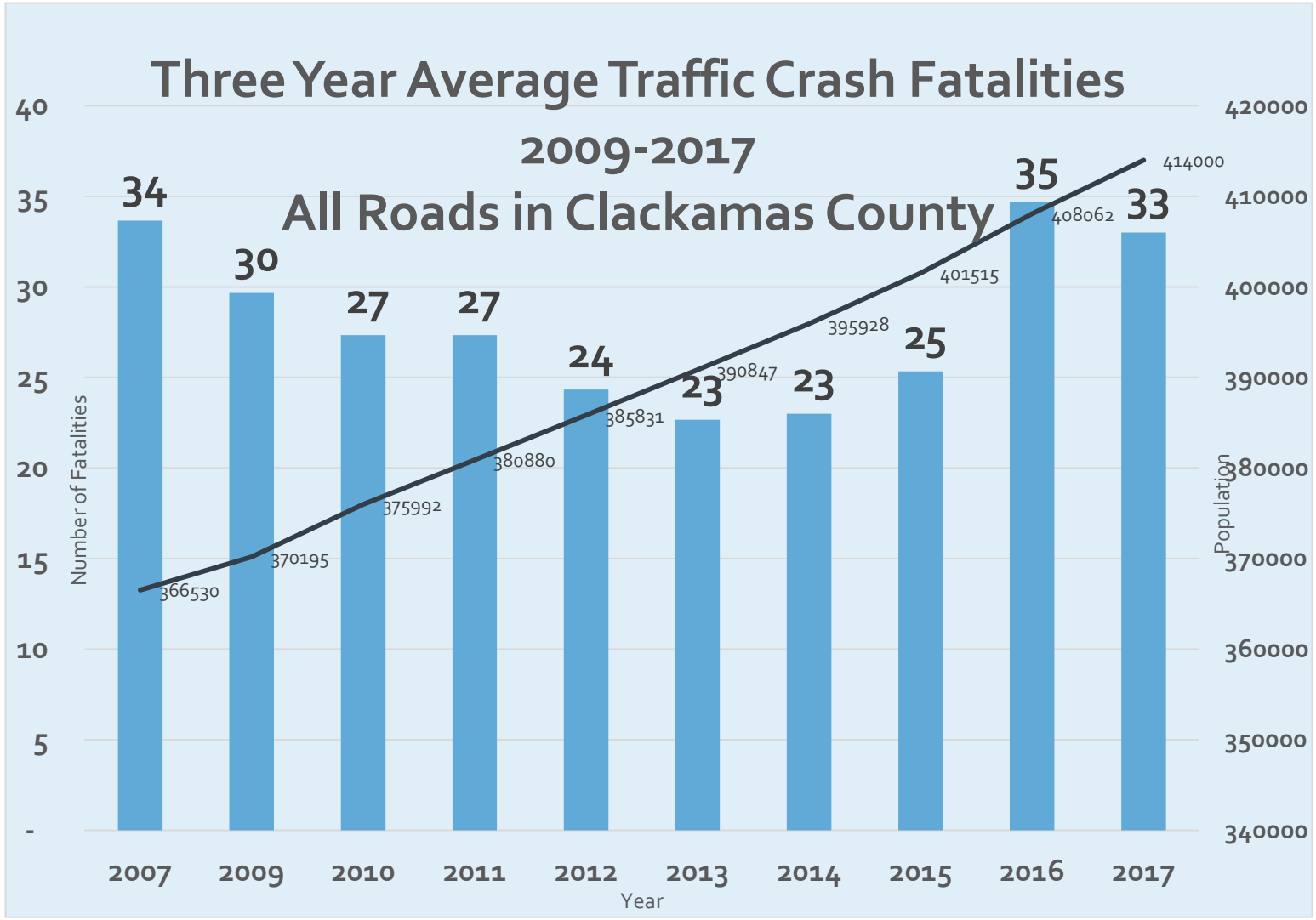
Plan Framework

- Introduction
- Part 1
  - Overall Data Trends
  - Emphasis Area Action Items
- Part 2 (Local Roads Safety Plan)
  - High Crash Locations
  - Infrastructure Projects
- Implementation & Evaluation

Drive to Zero Safety Action Plan Part 1

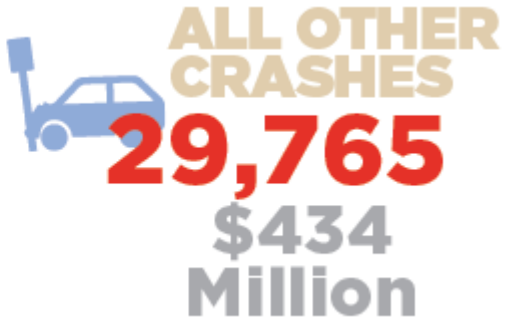
- Existing Crash Data Trends
- Safe Drivers and Passengers
- Safe Infrastructure
- Safe Vehicles
- Safe Vulnerable Users
- Enhanced Emergency Medical Services
- Safety Culture
- Safety Management

Three Year Averages for Crash Fatalities



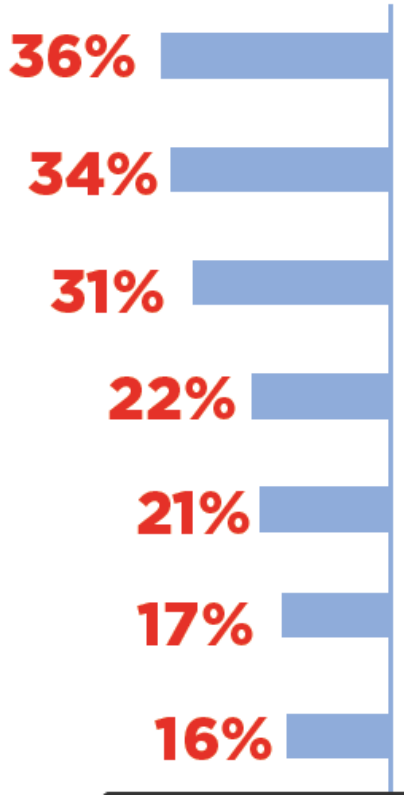
Crash Data

From 2009 to 2015: County figures with economic impact.



The most frequent contributing factors in reported crashes are:

Fatal and Serious Injury Crashes by Contributing Factor



The most frequent contributing factors to fatal and serious injury crashes are:

Inexperienced Drivers: Crashes in which the driver was 25 years of age or younger.

Roadway Departures: Crashes in which the vehicle left the roadway or crossed over the center line.

Aggressive Driving: Crashes in which the driver was driving too fast for conditions, following too closely, failing to avoid vehicle ahead, or exceeding the posted speed limit.

Motorcyclists: Crashes involving a motorcycle driver or passenger.

Alcohol/Drug: Crashes in which the driver was under the influence of alcohol or drugs.

Senior Drivers: Crashes in which the driver was 65 years old or older.

Pedestrians and Bicyclists: Crashes involving a person walking or bicycling.

Safe System Approach

The Safe System approach prioritizes safety first when designing infrastructure. The principles of this approach include:

- People will make mistakes, but these mistakes should not lead to death or serious injury.
- Speeds have a direct relationship to the severity of crashes.
- Safety is everyone's responsibility, especially the designers of the system.
- Safety must be considered at all levels to provide redundancy when one part fails.

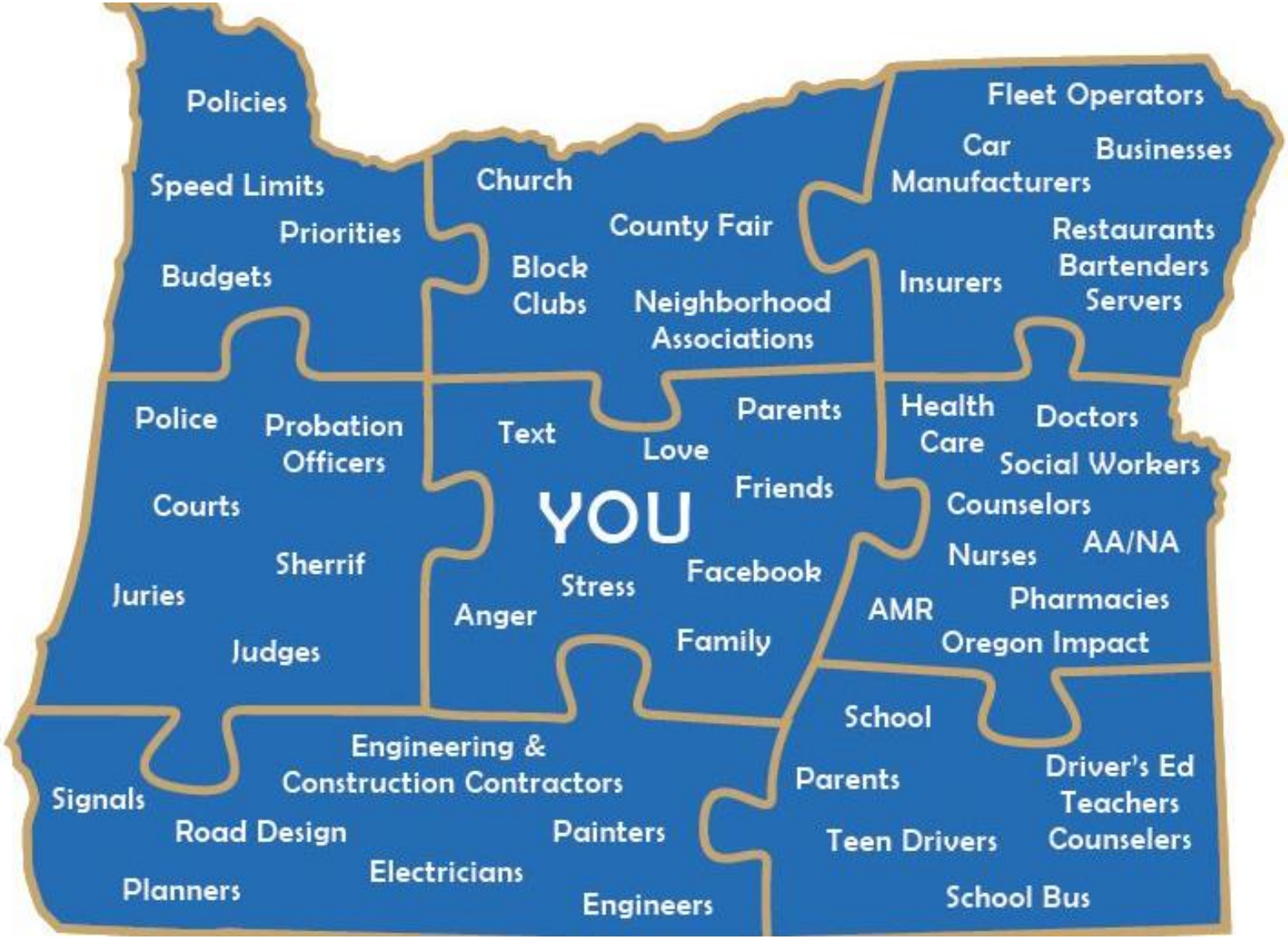
Source:

Towards Zero Deaths Foundation.
http://www.towardszerofoundation.org/thesafesystem/#principles

Goal:

Eliminate fatal and serious injury crashes on County roads by 2035.

Build **safety culture** through a **Safe Systems** approach to transportation design and management.



Part 1 Action Items

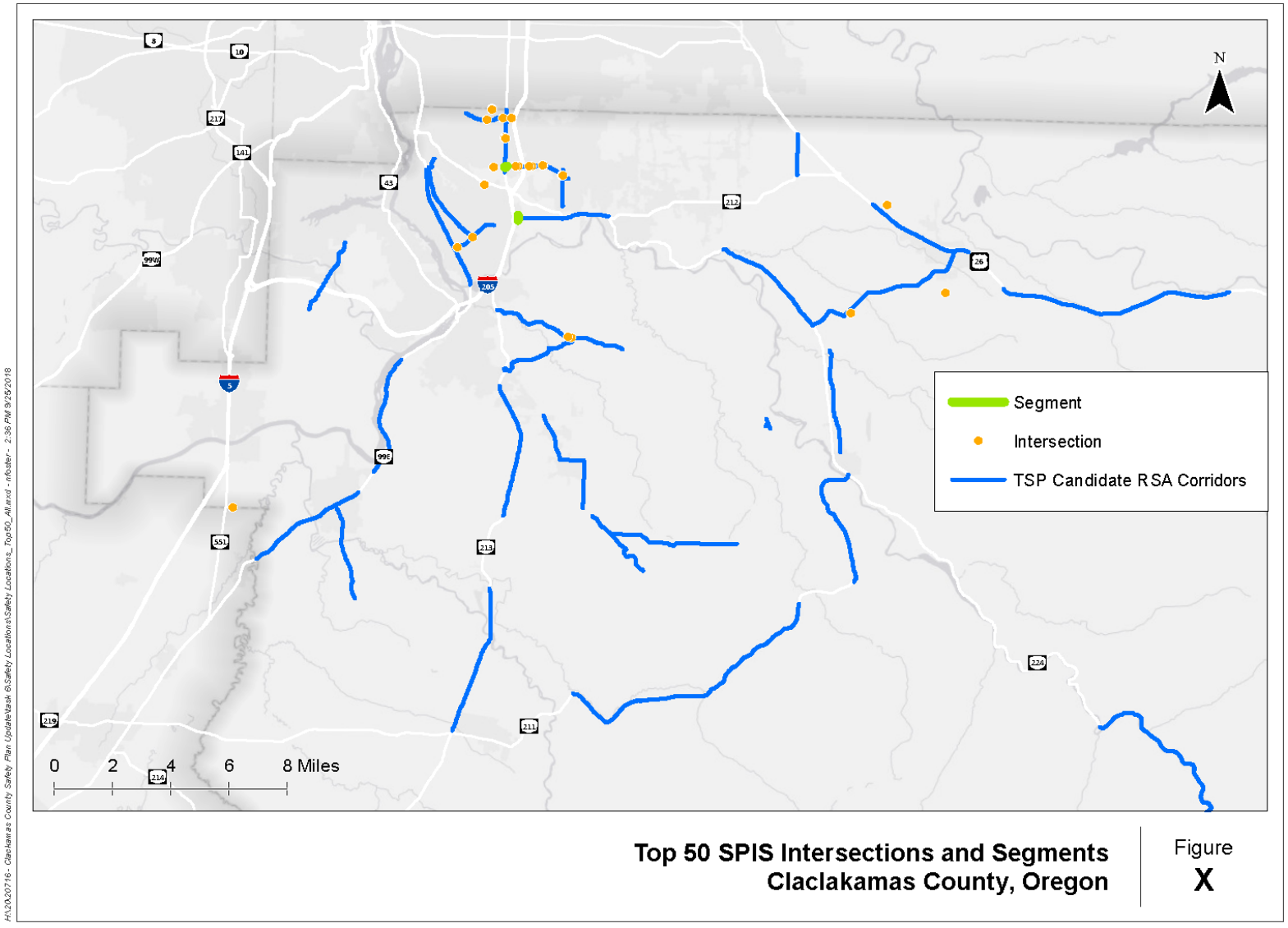
- Sources
  - Stakeholder Listening Sessions
  - County Staff
  - Current TSAP
  - Best Practices
- By Emphasis Area
- Assign Responsibility, Support, & Timeframe

Part 2

Local Road Safety Plan

- Location-Specific Safety Treatments
- Systemic Safety Treatments
- Funding Constrained Plan

Locations


Clackamas County Safety Plan Update
September 2018
N
Segment
Intersection
TSP Candidate RSA Corridors
0 2 4 6 8 Miles
Top 50 SPIS Intersections and Segments
Claclakamas County, Oregon
Figure
X
Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
KITTELSON & ASSOCIATES

Crash Patterns

- Unsignalized Intersections
  - Angle & Turning Crashes
- Signalized Intersections
  - Rear-End Crashes
  - Turning Crashes (with permissive LT phasing)
- Rural Segments
  - Roadway Departure Crashes
- Urban Segments
  - Intersection/Driveway Crashes

Pedestrian & Bicycle Crashes

- Separation on Segments
  - Clackamas County ATP Guidance
  - Sidewalks
- Improved Crossings
  - RRFBs/PHBs
  - Refuge Islands
  - Crosswalk Markings/Signs
  - Curb Extensions
  - Signal Timing/Phasing Treatments

How Do We Achieve Zero Fatal/Serious Injury Crashes?

- How Can You (Respondent) Help?
  - Driving attentively
  - Driving slowly
  - Driving calmly and defensively
- What Should County Do?
  - Increasing enforcement efforts (speeding & distracted driving)
  - Lowering speed limits/traffic calming
  - Implementing pedestrian and bicycle infrastructure
  - Improving/maintaining roadways and intersections

Funding

- Projects will have estimated cost and B/C ratio
- Review projected annual budget for safety projects
- Project timeframe for completing work
- Continued Drive-to-Zero outreach efforts

Next Steps

- Review and revisions to draft TSAP
- Schedule BCC hearing on January 24, 2019 for adoption
- Formal roll out: February – June 2019

Questions


Texting
EQUALS
Driving
Blind
DON'T TXT & DRV
DriveToZero.org
Don't become a statistic.
Behind the wheel, one text while driving equals 4 beers which is a .08 blood alcohol level and equal to drunk driving.
Art design by Alyssa Bigelow, Sandy High School

LET'S STOP CRASHES
DRIVE to ZERO
IN CLACKAMAS COUNTY
Safety Action Plan

CLACKAMAS COUNTY

Drive to Zero Safety Action Plan Part 1

EXISTING CRASH DATA TRENDS

SAFE DRIVERS AND PASSENGERS

SAFE INFRASTRUCTURE

SAFE VEHICLES

SAFE VULNERABLE USERS

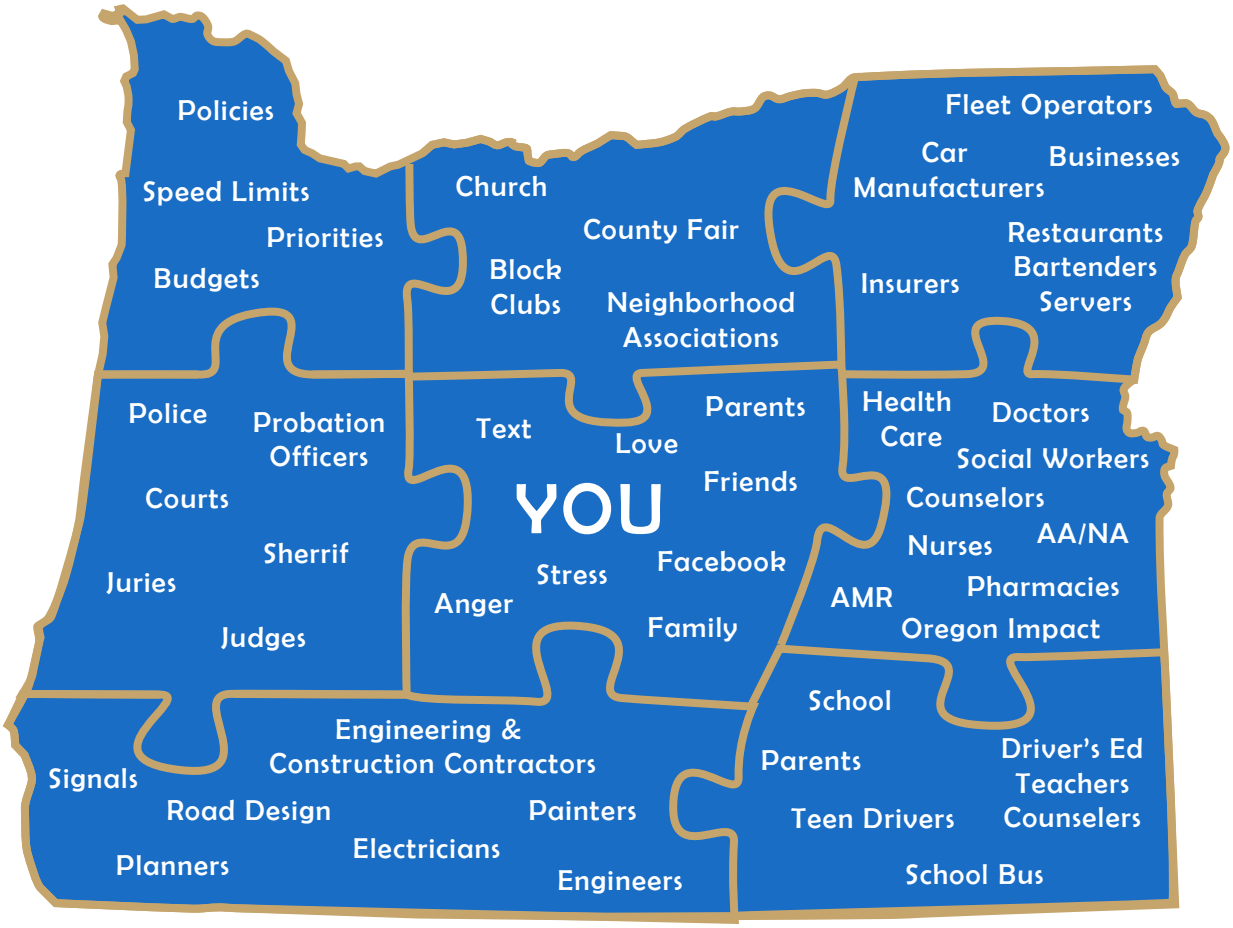
ENHANCED EMERGENCY MEDICAL SERVICES

SAFETY CULTURE

SAFETY MANAGEMENT

Part 1 Introduction

Clackamas County has set a goal to eliminate fatal and serious injury crashes on its roads by 2035. Part 1 of Clackamas County's **Drive to Zero Safety Action Plan** describes the broad areas the County, its partner organizations, and its residents must focus on to achieve this goal. These emphasis areas represent an evidence-based approach to reducing fatal and serious injury crashes, and they are based on a review of crash data in Clackamas County and best practices from local, national, and international sources. Notably, the emphasis areas align with those of *Toward Zero Deaths: A National Strategy on Highway Safety*[1], of which the County is a proud partner, and the *Oregon Transportation Safety Action Plan, 2016*[2].



1 Toward Zero Deaths Steering Committee. Toward Zero Deaths: A National Strategy on Highway Safety. June 2014. http://www.towardzerodeaths.org/.

2 Oregon Department of Transportation. Oregon Transportation Safety Action Plan, 2016. 2016. http://www.oregon.Gov/ODOT/Safety/Documents/TSAP_2016.pdf.

Part 1 Introduction (continued)

Part I of the Safety Action Plan outlines a strategy for the County to build its Safety Culture and eliminate traffic fatalities and serious injuries by 2035. **Successful implementation of this plan depends upon everyone,** including emergency medical services personnel, activists and educators, local leaders, law enforcement, businesses, engineers, and most importantly, the travelling public. Everyone uses the road system either by driving, walking, biking, using transit, or relying on goods and services that travel on the roads.

Achieving our goal of zero fatal and serious injury crashes by 2035 will take a team effort—are you in?

Part 1 is organized into the following sections:

- Crash Data Trends
- Safe Drivers and Passengers
- Safe Infrastructure
- Safe Vehicles
- Safe Vulnerable Users
- Enhanced Emergency Medical Services
- Safety Culture
- Safety Management

The Safe System

The Safe System approach prioritizes safety first when designing infrastructure. The principles of this approach include:

- **People will make mistakes, but these mistakes should not lead to death or serious injury.**
- **Speeds have a direct relationship to the severity of crashes.**
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- **Safety must be considered at all levels to provide redundancy when one part fails.**

Source:
Towards Zero Deaths Foundation. http://www.towardszerofoundation.org/thesafesystem/#principles

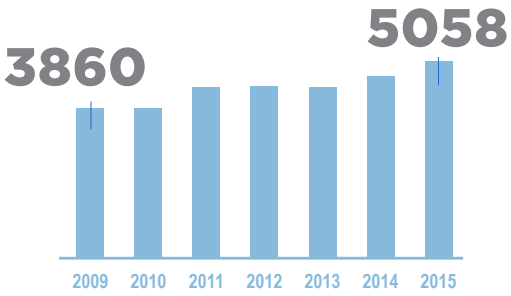
Existing Data Trends and Efforts

Crash Data

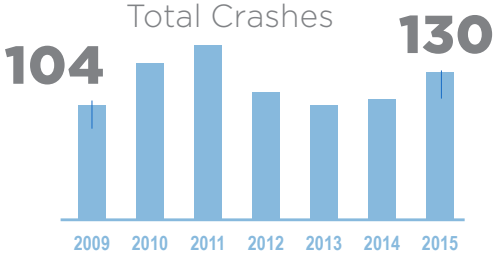
From 2009 to 2015, **183** people were killed in traffic crashes in Clackamas County. Another **795** people suffered serious, potentially life-altering injuries.

The economic impact of these and other less severe crashes, was **$787.5 million,** or about **$112.5 million per year.** The economic costs during this time are shown by crash type below.

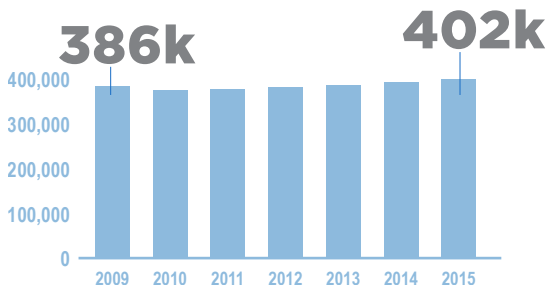
Over the past seven years, reported total crashes and reported fatal and serious injury crashes have generally increased in Clackamas County. This increase has outpaced the County's population growth of 4% over the time shown.



Total Crashes



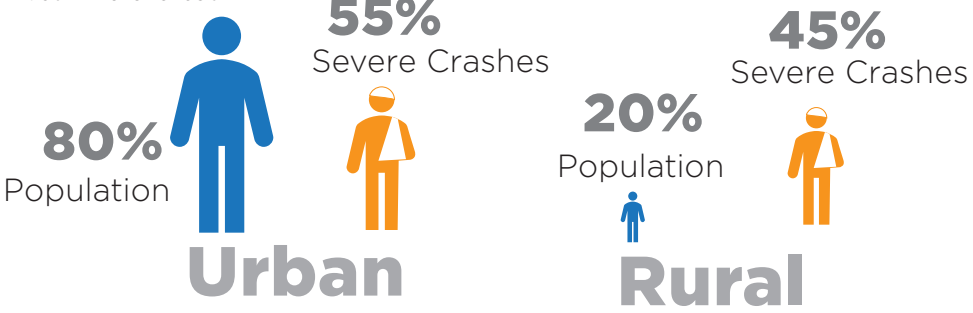
Fatal and Serious Injury Crashes



County Population Growth

Rural vs. Urban

People must drive further in rural areas to reach destinations and emergency response times can be longer than in urban areas. Speeds are also higher than in urban areas and there are fewer transportation options. As a result, rural areas are more susceptible to severe crashes than urban areas. As shown below, 45% of reported severe crashes occurred in rural areas, while 20% of the population lives in rural areas.*



*Urban areas, as defined by the Federal Highway Administration, include any areas defined by the Census as being urbanized (either urbanized areas or urban clusters) with a population of 5,000 or greater. By this definition, Molalla is considered urban and Estacada is not.

The Real Cost of Crashes

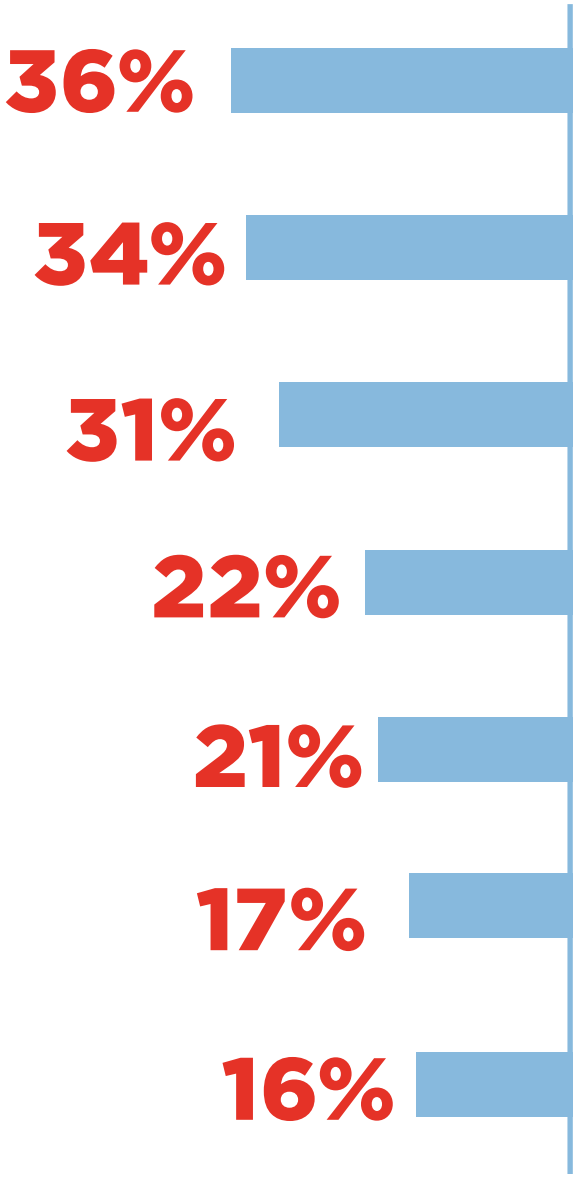
More difficult to calculate than the economic costs of crashes are the quality of life costs. So many of us know someone who was impacted by a crash, and those impacts reverberate throughout entire communities.

One such tragic event involved 6-year-old Derick Bedwell, who was killed in a drunk-driving crash in rural Molalla in June 2018. Because of the remote location, the victims had to flag a passing vehicle and travel 13 miles to reach cell service. By the time medical personnel arrived, it was too late. Derick's death impacted his family, his friends, and his entire community.

In addition to tragic fatal crashes like this, crashes that don't end lives can still drastically affect them. Health issues stemming from serious crashes can lead to job and housing loss, financial trouble, and mental health problems.

The most frequent contributing factors in reported crashes are:

Fatal and Serious Injury Crashes by Contributing Factor



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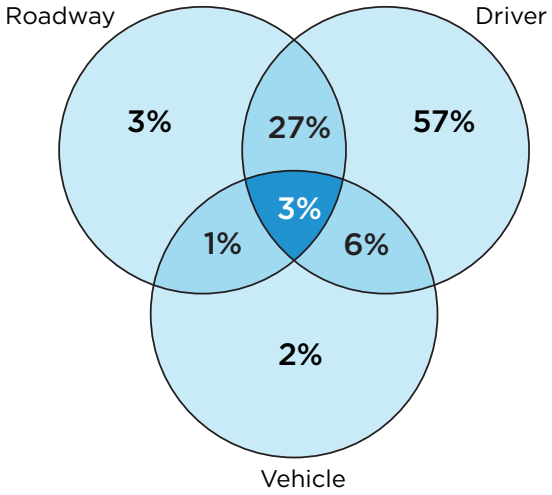
Pedestrians and Bicyclists: Crashes involving a person walking or bicycling.

CLACKAMAS COUNTY

Safe Drivers and Passengers

Causes of Crashes

The most common cause of crashes in Clackamas County, as well as throughout the country, is human error. As shown to the right, human error is a factor in 93% of crashes, while vehicle and infrastructure factors are present in 34% and 12% of crashes, respectively[1]. Simply put, for the County to reach its goal of zero fatal and serious injury traffic crashes, people will need to make better decisions. Specifically, people will need to drive calmly, attentively, and sober, wear seatbelts, and use child-passenger seats properly. Additionally, people will need to understand when their cognitive functions are declining and they shouldn't drive, and options need to be available for these people to use other modes.



Attentive Driving

Data on distracted driving is difficult to collect, but in 2017, the Oregon Department of Transportation (ODOT) Distracted Driving Task Force Report[2] estimated a crash caused by distracted driving occurs every three hours. Distracted driving can take many forms, including eating, talking with passengers, and looking away from the road ahead. This topic has received increasing focus because of the rise of the use of cell phones, GPS devices, and other portable electronic devices while driving. Further, research from the AAA Foundation for Traffic Safety[3] similarly reveals that in-vehicle technology like voice-based and touch screen features cause people to take their eyes and mental focus off the road and hands off the wheel for potentially dangerous periods of time.

In response to findings and recommendations made by the ODOT Distracted Driving Task Force, House Bill 2597 took effect on October 1, 2017 and makes it illegal to drive in Oregon while holding or using any electronic device, including cell phones, tablets, GPS, or laptops.

However, new distracting, in-vehicle electronics and technologies are constantly entering the market. No matter what the newest distraction may be, all drivers need to have their focus on the road.

Attentive Driving – What Can You Do?

- *Place electronic devices in a location you can't access them before you turn the car on*
- *If you need to use an electronic device, pull over into a legal parking spot*
- *Consume food or drink before or after driving*
- *Stay alert for wildlife crossing the roadway in rural areas*
- *Program music or directions before you start driving*
- *Take the Drive to Zero Attentive Driving Pledge[4]*

1 Treat, et al. Tri-Level Study of the Causes of Traffic Accidents. 1979

2 Reducing Distracted Driving in Oregon: An Interdisciplinary Approach to a Statewide Problem. Oregon Department of Transportation. February 2017.

3 Visual and Cognitive Demands of Using In-Vehicle Infotainment Systems. AAA Foundation for Traffic Safety. October 2017.

4 https://www.clackamas.us/drivetozero/pledge.html

Safe Drivers and Passengers

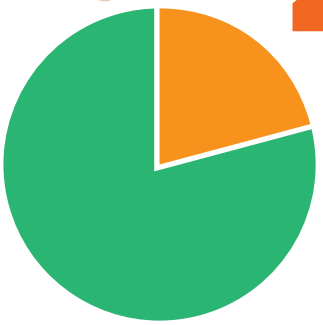
Action Items – Attentive Driving

- Work with employers to institute distracted driving policies at their workplaces. The National Safety Council has a sample contract in its Distracted Driving toolkit.
- Educate youth and adults on the importance of paying attention when using the transportation system.
- Encourage businesses, institutions, and families to create policies related to driving safety, including attentive driving.

Outreach should be tailored for the audience it targets. One important way to do this is to provide information in multiple languages in locations with high non-English speaking populations.

Sober Driving

Over one-fifth of reported crash fatalities and serious injuries in Clackamas County involve alcohol- or drug-impairment. Additionally, fatigue, stress, and medications can lead to an impaired state that increases the risk of a crash.



21%

of fatal and serious injury crashes involved an impaired driver (2009-15)

Action Items – Sober Driving

- Work with alcohol and marijuana retailers/servers to encourage compliance checks to deter selling to, and reward those who do not sell to, underage individuals.
- Promote the Oregon Liquor Control Commission's Responsible Vendor Program.
- Provide educational posters, social media posts, and public service announcements to inform the public about the dangers of impaired driving.
- Work in schools to educate students on the consequences of impaired driving.
- Coordinate with enforcement agencies to gain support of legislation and penalties associated with impaired driving.
- Enhance Driving Under the Influence of Intoxicants (DUII) and impaired driving enforcement.

The Clackamas County Drive to Zero team offers the Posters & Coasters Safe Driving Media Contest to high school students in the County. The contest asks students to create artwork about safe driving for a chance to win prizes and share safe driving behavior with their local community. Nearly 100 high school students entered in 2018, with the winning poster shown here:

Safe Drivers and Passengers

- » Data-driven saturation patrols.
- » Drug recognition training (DRE & K9), standardized field sobriety tests training, and wet labs.
- » Assign a dedicated DUII enforcement unit.

Sober Driving – What Can You Do?

- *Drive sober and alert*
- *Plan your ride home or assign a designated driver before you begin drinking or using marijuana*
- *Prevent others from driving when they're intoxicated*
- *Know the effects of any medication you're taking, prescription or over-the-counter.*

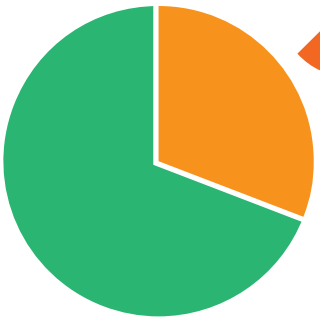
- Develop repeat DUII driver offender programs focused on treating the causes of DUII.
- Provide Drug Recognition Expert (DRE) training for all county law enforcement officers.
- Grow partnerships and support existing efforts to reduce underage drinking, underage marijuana use, and drug use through funding, educational outreach, and coalition membership.
  - » Partner with substance abuse treatment programs.

A substance use disorder is a treatable condition in which the use of alcohol or other substances leads to a clinically significant impairment or distress.

Calm Driving

Aggressive driving was a factor in 46% of all reported crashes and 31% of reported fatal and serious injury crashes in Clackamas County from 2009 to 2015. Of these severe crashes, 85% involved speeding or driving too fast for conditions.

We take our personal lives with us wherever we go. If we're stressed our angry, that can carry through to our use of the transportation system and lead to frantic and dangerous driving. Efforts from the Clackamas County Public Health Division as described in **Blueprint for a Healthy Clackamas County** are critical to ensuring road users are in the right mental state to drive.



31%

of fatal and serious injury crashes involved aggressive driving (2009-15)

Calm Driving – What Can You Do?

- *Plan enough time to reach your destination so you don't need to speed to arrive on time*
- *Drive the speed limit and leave ample following distance*
- *Yield right-of-way to pedestrians and bicyclists at crosswalks and driveways*
- *Calm yourself before driving if feeling stressed or angry.*

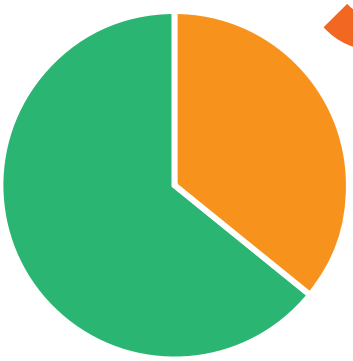
Safe Drivers and Passengers

Action Items – Calm Driving

- Install speed feedback signs.
- Work with ODOT and individual cities to implement best practices in setting design speeds and speed limits, including implementing risk-based speed limits
- Implement automated enforcement of speeding and red-light running. This can only be used in cities, not in unincorporated communities of Clackamas County.

Inexperienced Drivers

Inexperienced drivers are drivers age 15 through 25. This demographic accounted for 40% of all reported crashes and 36% of reported severe crashes. Throughout the U.S., motor vehicle crashes are the leading cause of death for teenagers. These drivers' inexperience and their likelihood to overrate their driving abilities require special attention, according to *Toward Zero Deaths: A National Strategy on Highway Safety*. Several actions can be taken to improve young driver safety.



36%

of fatal and serious injury crashes involved inexperienced drivers (2009-15)

Inexperienced Drivers – What Can You Do?

- *Work with young family members to impart safe driving principles before they reach driving age*
- *Enroll teens approaching driving age in formal driver education courses*
- *Sign a Parent-Teen Driving Contract[1] with young drivers in your family*
- *Lead by example – always drive attentively, calmly, and sober*

Action Items – Inexperienced Drivers

- Support driver education programs, especially in rural areas that may struggle for access to programs.
- Begin safety education before young people reach driving age, as early as preschool.
  - » Partner with groups such as **Safety Towns** and school districts.
- Support family-based education to leverage parental influence.
- Continue to support peer-based marketing efforts.
- Continue outreach programs in high schools County-wide to provide driver and non-motorized mode safety education.

According to an ODOT analysis, young drivers, ages 15-20, without driver's education account for over 90% of all crashes involving drivers of this age.[2]

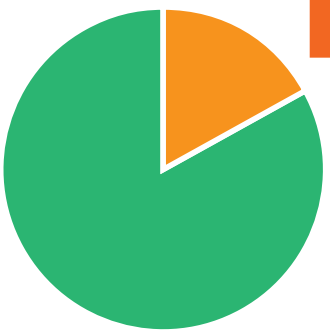
1 https://www.cdc.gov/MotorVehicleSafety/pdf/Driving_Contract-a.pdf

2 October 19, 2018 ODOT Press Release "Driver Education making all the difference in the world in Oregon."

Safe Drivers and Passengers

Senior Drivers

Senior drivers are age 65 or older. This demographic accounted for 18% of all reported crashes and 17% of reported severe crashes. Lowered motor skill coordination at older ages, combined with a continued need to drive for access to medical care, shopping, and socialization creates special needs for this population. Several actions can be taken to improve senior driver safety



17%

of fatal and serious injury crashes involved senior drivers (2009-15)

Seniors rely on transportation for socialization and medical needs. To enable them to access these critical needs without driving themselves, transportation options are necessary. This is a particular challenge in rural areas, where bus options are often minimal and pedestrian infrastructure is often lacking.

Action Items – Senior Drivers

- Encourage conversations about safe driving between family members and the health care community through educational campaigns and supporting materials such as pamphlets and online resources.
- Teach people about the impact of medicines on their ability to think clearly and react quickly.
- Support training sessions through AARP and insurance companies to help seniors maintain driving skills.
- Provide transportation options through multimodal infrastructure.
  - » Focus this effort in rural areas where maintaining mobility without driving is most difficult.
  - » Partner with transportation assistance programs to promote non-driving options.

Senior Drivers – What Can You Do?

- *Take the online AAA Roadwise Driver Course*[1]
- *Use transit options such as TriMet and Clackamas County Transportation Reaching People when possible*
- *Ask your doctor or pharmacist to review medicines for side effects such as drowsiness that may affect safe driving*
- *Have your vision checked annually*
- *Drive during daylight hours when possbile*

1 https://seniordriving.aaa.com/maintain-mobility-independence/driver-improvement-courses-seniors/take-online-defensive-driving-course/

Safe Drivers and Passengers

Seat Belts, Child Passenger Seats, and Pet Harnessing

The state of Oregon boasts a seatbelt usage rate of 98%[1], among the highest in the country. In Clackamas County 8% of severe crashes involved a driver or passenger not wearing a seatbelt. Additionally, while just 2% of all occupants don't use seatbelts statewide, crashes involving drunk or drugged driving had an unbelted occupant 19% of the time.

Child passenger seats must be installed and used properly to achieve their full benefit. Additionally, pets need to be harnessed in vehicles to protect them, vehicle operators, and emergency responders.

Action Items – Restraining Devices:

- Support Safe Kids Oregon, ODOT, and Oregon Impact in their education efforts on child passenger safety.
- Raise awareness of the frequency of incorrect car seat installation. Provide information on the safety outcomes of properly installed car seats, including types of seats, when they should be front or rear facing, when children should be seated in the front or back of vehicles, and other laws related to seat belt use.
- Provide car seat installation assistance. If possible, offer reduced priced seats for low-income families.
- Support education, marketing, and enforcement efforts to further increase seat belt usage in Clackamas County.
- Complete gap analysis of child passenger safety in Clackamas County.
  - » Implement recommendations from gap analysis report.

8%

of all fatal and serious injury crashes involved an occupant not wearing a seat belt (2009-15)

Restraining Devices – What Can You Do?

- *Use your seat belt and encourage others in your vehicle to do the same*
- *Raise awareness of the frequency of incorrect car seat usage. Provide information on how to properly use car seats, including when they should be front or rear facing, when children should be seated in the front or back of vehicles, how to properly use car seats while wearing a winter coat, and how to avoid unsafe after-market items and toys.*
- *Get a child seat checkup with Oregon Impact[2]*
- *Use new car seats so that you know they are safe*
- *Check for child passenger seat recalls at https://www-odi.nhtsa.dot.gov/recalls/childseat.cfm*

1 Oregon Department of Transportation. Oregon Transportation Safety Action Plan. 2016.

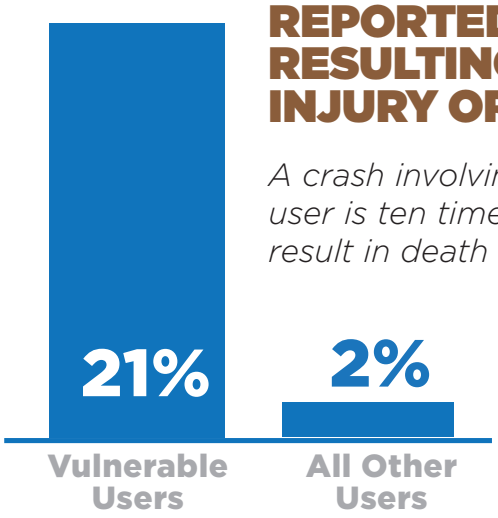
2 http://oregonimpact.org/car-seat-resources.htm

Vulnerable Users

People walking, bicycling, or riding a motorcycle are considered vulnerable users because they do not have the same physical protection as people in a motor vehicle. People walking, bicycling, or on motorcycles are involved in a disproportionately high number of fatal and serious injury crashes.

PERCENTAGE OF REPORTED CRASHES RESULTING IN SERIOUS INJURY OR DEATH

A crash involving a vulnerable user is ten times more likely to result in death or serious injury.



Other Plans

The Oregon Department of Transportation **Safety Action Plan** lists improving vulnerable user safety as a near-term emphasis area and the Towards Zero Deaths national strategy lists safer vulnerable users as a key area. Lastly, the **Blueprint for a Healthy Clackamas County** and **Clackamas County Drive to Zero** program define a long-term goal of eliminating all pedestrian, bicycle, and motor vehicle traffic crash fatalities in Clackamas County.

A study from the US Department of Transportation shows that the faster a vehicle is traveling, the higher the likelihood is that a pedestrian crash will be fatal.

DEATH DUE TO SPEED

U. S. DEPARTMENT OF TRANSPORTATION, LITERATURE REVIEWD ON VEHICLE TRAVEL SPEEDS AND PEDESTRIAN INJURIES. MARCH 2000.

Image created by the Portland Bureau of Transportation.

Vulnerable Users

Action Items

Pedestrians

People walking face most of their conflicts with motor vehicles. Action items to mitigate pedestrian crashes include:

- **Work with partners** through safety fairs, school presentations, town halls, and community events to develop and execute safety education, including the following outreach for children:
  - » Safe crossing practices.
  - » Not playing behind vehicles or near streets.
  - » Importance of adult supervision.
- **Adult pedestrian outreach,** such as safe crossing practices and new pedestrian infrastructure education.
- **Roadway design** integrating pedestrian safety considerations by providing pedestrian infrastructure, encouraging slower motor vehicle speeds, and minimizing conflict points between people walking and people driving (see Part II for more information).
  - » Sidewalks, pathways, and other walkways separating pedestrians from motor vehicles along roadways.
  - » Enhanced roadway crossings, where appropriate.
  - » Pedestrian-focused traffic signal timing, such as elimination of permissive right-turns on red and leading pedestrian intervals.
- **Continue to support** the Clackamas County Safe Routes to School program
- **Continue support** for County Bike and Pedestrian Program.

Pedestrians – What Can You Do?

- *Be attentive and put away electronic devices when walking or rolling*
- *Cross the roadway at crosswalks and lights*
- *Pay extra attention to look for people who may be crossing, or about to cross, the street at all intersections and other crossings.*
- *Wear high-visibility clothing*

Action Items

Bicyclists

Bicyclists face the most conflicts with motor vehicles. The following action items can improve bicycle safety outcomes.

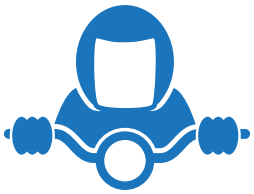
- **Education and awareness** campaigns centered on driver and bicyclist behavior, common crash types, and low-light visibility issues.

Bicyclists – What Can You Do?

- *Wear a helmet and use front and rear lights*
- *Obey all traffic laws and ride predictably*
- *Give ample space between your vehicle and people bicycling when passing*

Vulnerable Users

- **Roadway design** integrating bicycle safety considerations by providing appropriate bicycle infrastructure, encouraging slower motor vehicle speeds, and minimizing conflict points between bicyclists and people driving (see Part II for more information).
  - » Shared lane markings, wayfinding, and where necessary, traffic calming for lower speed and volume roadways.
  - » Increasing physical separation between people biking and motor vehicles as motor vehicle volumes and speeds increase, including physical barriers at higher speeds and volumes.
- **Continue to support** the Clackamas County Safe Routes to School programs.
- **Continue support** for County Bike and Pedestrian Program.
- **Support prevention agencies** such as Think First who provide training and education related to helmet use.



Action Items

Motorcyclists

Motorcycles are motor vehicles, but they have a lower level of protection, and they face higher traffic injury and fatality risks. One of the best ways to improve motorcycle safety conditions is through education and outreach efforts.

Ideally, motorcycle education efforts should leverage motorcycle culture and be led by fellow riders. This can include outreach on:

- Proper safety equipment.
- Safe riding practices.
- Motorcycle handling skills and maintenance.
- ODOT and Team Oregon training and

Motorcyclists – What Can You Do?

- *Wear a helmet and protective clothing*
- *Obey all traffic laws and ride predictably*
- *Take a Team Oregon motorcycle training course*[1]

Other vulnerable roadway users include construction workers, law enforcement agents, and adopt-a-road volunteers as well as skateboard, e-scooter, Segway, and hoverboard users.

1 http://team-oregon.org/training/

Safe Infrastructure

The choices drivers make are influenced by the roadway infrastructure around them. For instance, people may feel comfortable driving faster than the posted speed limit on a roadway that is designed for faster speeds. Further, people will make mistakes when they drive. Whether these errors result in death or serious injury depends, in part, on infrastructure design.

Vehicle technology is rapidly changing as we move toward a future with connected and autonomous vehicles. Infrastructure that is designed to communicate with vehicles will help prevent collisions in the future. Guiding principles and policies to support safety infrastructure include:

Safety should be a priority on every project

- Consider safety-based measures for a given design criteria to evaluate roadway performance.
- Develop a policy and practice for incorporating safety assessments into project development, design, and construction.
- Convene a group to investigate incorporating increased safety analysis requirements into development review:
  - » Develop and implement crash frequency standards.
  - » Assess impact fees for trips through Safety Focus roadways and intersections.
- Integrate Road Safety Audits (RSAs) into the project development process. Encourage RSAs on existing roads and intersections.

Deploy safety countermeasures related to safety emphasis areas

- See Part 2 of the plan for more information on specific countermeasures and locations.

Design for all expected users

- Design appropriate infrastructure for people walking and biking.
- Educate and inform users of infrastructure changes.
- Enact roadway design standards that encourage vehicle speeds appropriate for the surrounding land use context

Performance Clackamas sets Pavement Condition Index (PCI) goals to:

- By 2022, maintain the average condition of paved county roads at 70 PCI or higher.
- By 2022, improve the average condition of urban local roads to a PCI or 70 or higher.

Prepare roadways, streetlights, signals, etc. for vehicle to infrastructure communication

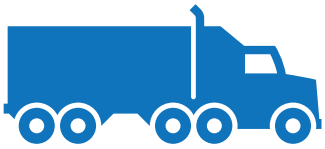
- Monitor future trends to discern best way to pursue this action item.

Safe Vehicles

Vehicle factors, such as brake failure, tire underinflation, and vehicle-related vision obstructions are the sole cause of about 3% and contribute to about 12% of reported crashes in the United States[1]. While vehicle-only contributing factors are rare, eliminating them provides opportunities to save more lives. Advances in vehicle technology will help reduce collisions and protect occupants. This section discusses Clackamas County's role in improving commercial fleet vehicle safety and passenger vehicle safety.

Action Items – Safe Vehicles

Clackamas County efforts can help improve safety performance for commercial and personal vehicles:



Commercial Vehicles

- Increase Motor Carrier Safety inspections and outreach.
- Develop safety standards for County fleet vehicles.

Personal Vehicles

- Develop and implement education and outreach efforts to communicate safety benefits and limitations of new vehicle technologies.
- Analyze crashes involving vehicle malfunctions and use results to inform outreach, and possibly enforcement, efforts.

Safe Vehicles – What Can You Do?

- *When purchasing a new or used vehicle, compare its safety features[2] with other vehicles*

Technology Advances and Safety

Newer vehicles, and connected/automated vehicles, can help drivers avoid crashes and improve safety in the following ways:

- **Perform some driving-related tasks**
- **Alert drivers to risk.**
- **Assist drivers who are at risk of a crash.**
- **Protect vehicle occupants during a crash.**
- **Enable communication with other vehicles and the roadway.**
- **Help vehicles continue to perform as designed.**

Sources differ dramatically on when automated vehicles will hit the market and what levels of automation they'll possess. Some automation (such as cruise control) has been around for years, and vehicles that can drive themselves in specific situations and in good weather are on the streets now[1]. However, fully automated vehicles may not saturate the market for some time. Carmakers across the country hope to put fully automated vehicles on the market by 2025[2], but many in the industry[3] believe that obstacles such as crash ethics and cybersecurity could pose obstacles to widespread adoption.

1 http://www.businessinsider.com/lyft-deploying-self-driving-bmws-in-las-vegas-2018-5

2 https://www.edmunds.com/car-news/auto-industry/honda-plans-self-driving-cars-by-2025.html

3 https://www.technologyreview.com/s/602292/top-safety-official-doesnt-trust-automakers-to-teach-ethics-to-self-driving-cars/

1 Treat, et al. Tri-Level Study of the Causes of Traffic Accidents. 1979.

2 https://www.consumerreports.org/car-safety/cars-with-advanced-safety-systems/

Safety Culture

What is Safety Culture?

Safety Culture is the attitude, beliefs, perceptions, and values people share related to safety. It can be summed up by the phrase "the way we do things around here." For Clackamas County, Safety Culture is the attitude residents share about safe driving and other forms of transportation. Clackamas County recognizes the need to grow a positive Safety Culture and to have everyone agree that serious injury or death from a vehicle crash is not acceptable. We must grow this Safety Culture across the county.

Molalla Safety Culture Project

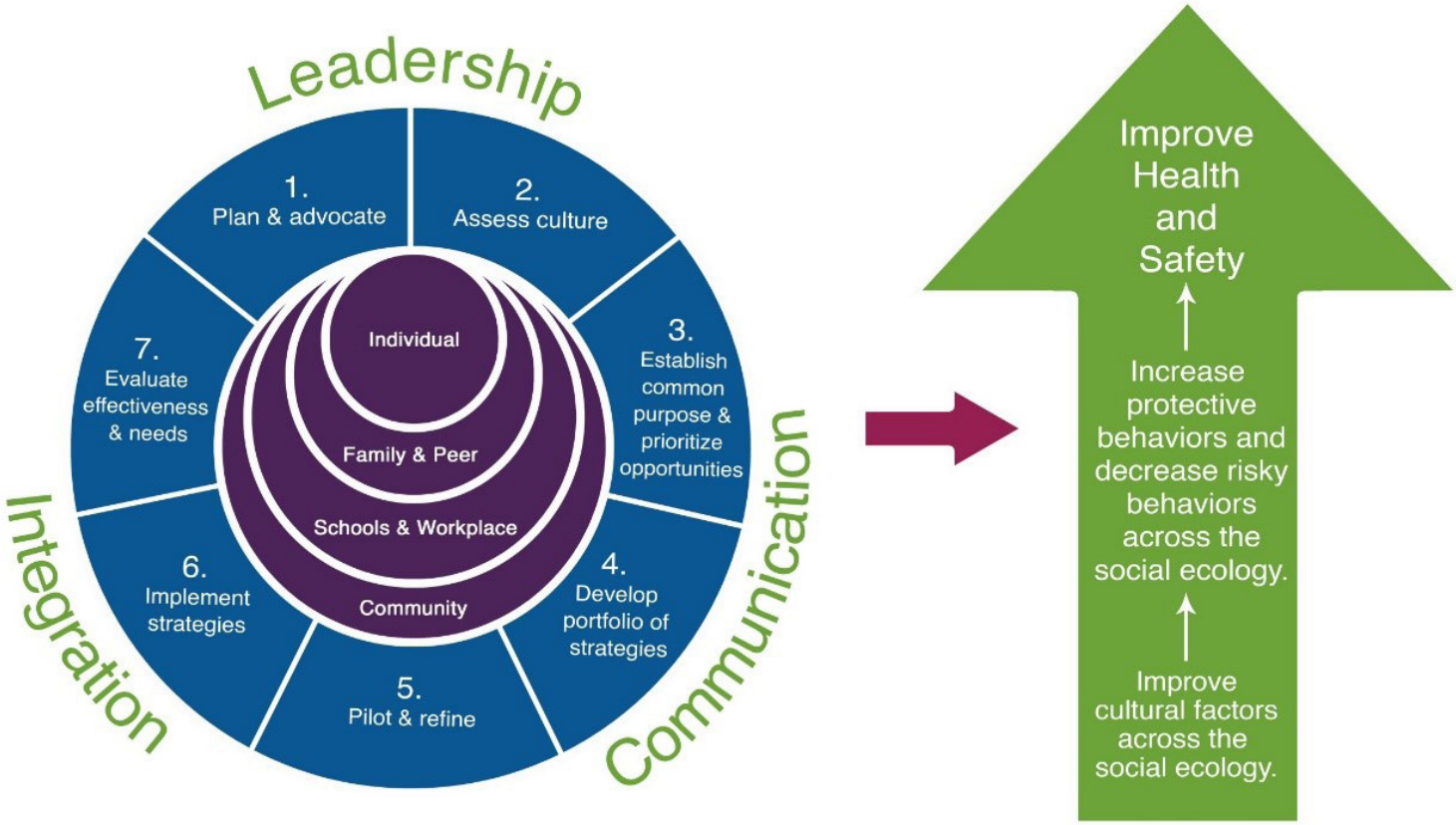
In 2016, Clackamas County began a pilot project to build a rural community traffic safety program incorporating the **Positive Culture Framework (PCF).** The Molalla rural area within the Molalla Rural Fire District boundary was selected due to their readiness including community-driven projects sponsored by the **Ford Family Foundation (FFF)** and the **Rural Development Initiatives (RDI).** They were also chosen due to an overrepresentation of severe and fatal crashes. **Molalla Drive to Zero (M-DTZ)** was formed under the umbrella of Molalla Communities that Care, a local non-profit. A fundamental component of the pilot was to establish a positive safety culture to encourage good choices and positive outcomes rather than traditional programs that focus on negative or traumatic methods of changing behavior.

Traffic Safety Culture is defined as the shared values and beliefs that influence decision making and behavior. **The Center for Health and Safety Culture at Montana State University (MSU)** provided consultation services including training and technical expertise on the PCF for the M-DTZ initiative. The PCF enhances efforts that grow a positive traffic safety culture. It is founded on the concept that there is positive in the community and it is worth growing. The outcome of the PCF framework was to support and enhance shared values and beliefs, in turn, decreasing risky behaviors.

MSU conducted a survey within the Molalla Fire Service boundary about community perceptions of traffic safety. Responses showed that community perception of traffic safety varied greatly. These surveys provided a lens through which stakeholders could better understand issues and perceptions within the community. The survey and local crash data also helped direct the program to select a focus area to work on, which was aggressive driving. As the program continued, other community projects were chosen to work on including hosting child passenger safety education events, improving access to driver education for high school students, and creation of safe driving policies for local businesses. While building capacity in the community for PCF takes time and effort, **there is deep interest in the community to grow a positive safety culture.** M-DTZ stakeholders have provided outreach at safety fairs and community events. They have also reached out to school representatives, elected officials and law enforcement to discuss community-wide safety collaboration opportunities. These critical first steps are helpful for the community to lay the groundwork to grow a positive safety culture in the community.

Clackamas County will continue to work with the community and support their efforts. Staff will reach out to other communities to continue local programs such as Molalla Drive to Zero.

Safety Culture



Positive Culture Framework from Montana University Center for Health and Safety Culture

In addition to the Molalla pilot project, the County's ongoing efforts to improve safety culture include:

- **Drive to Zero (DTZ)** is the Clackamas County initiative to eliminate fatal and serious injury crashes. It focuses on safe driving and safe roadways. DTZ runs a number of programs, including youth-oriented education and outreach efforts, media campaigns, and the Molalla pilot project.
- **The Clackamas County Traffic Safety Commission** consists of 12 Clackamas County residents including one or more high school students and meets monthly to discuss a variety of safety-related topics and provide a community perspective on what is needed to improve safety in the County.
- Publishing the **Blueprint for a Healthy Clackamas County,** which establishes a long-term goal to eliminate traffic fatalities in Clackamas County.
- **The Clackamas County Safety Routes to School Program** focusses on increasing safety, walking and biking to local schools. Included in the program is extensive outreach and encouragement about safety for all users.

Safety Culture

National Resources and Efforts

- **The Road to Zero Coalition** is made up of 687 members ranging from advocacy organizations to government to public health experts. Its report on strategies to get to zero traffic deaths identifies creating a positive safety culture as one of the three key strategies. It provides several resources on its website covering a variety of topics.
- **The Toward Zero Deaths** national strategy details how to shift culture away from transportation risk acceptance. It brings together various state and local initiatives to pursue a highway system that is free of fatalities.
- Several cities, counties, and states around the country have adopted **Vision Zero** initiatives, including the City of Portland and Oregon Department of Transportation. The Vision Zero Network provides resources to help communities reach this goal.
- **The Transportation Research Board Safe Systems Committee** identifies research needs, explains research findings to the public, and creates partnerships between organizations focused on Safety Culture.

Emerging Technology and Safety Culture

Emerging technology may assist drivers to avoid crashes, but it also may introduce new distractions or cause people to rely too much on the technology. It will be important to monitor the effects of emerging technology on driver behavior and integrate it into efforts focused on building a safety culture.

Action Items – Safety Culture

- **Continue improving** safety culture within the County itself, starting with departments directly associated with transportation safety, including the Department of Transportation and the Development and Department of Health, Housing, and Human Services.
  - » This could include safe driving contracts that contain an agreement to drive attentively, calmly, and sober and providing educational materials, videos, and seminars.
- **Continue the Drive to Zero Molalla project.**
- **Build off the Drive to Zero Molalla project** and extend Positive Culture Framework applications to other communities in the County.
- **Reach out to media** to encourage positive reporting instead of negative or traumatic messaging.
- **Continue to support** the Clackamas County Safe Routes to School program, including education and encouragement efforts.

Safety Culture – What Can You Do?

- *Contact the Department of Transportation & Development for your block club or neighborhood association to work with Clackamas County's safety team to build neighborhood traffic safety culture*

Safety Management

Safety management includes:

- Communication between safety partner organizations;
- Safety analysis capacity building; and,
- Data management.

Improved safety management will result in a coordinated and efficient effort to improve Clackamas County's transportation safety outcomes.

Communication between Safety Partners

Various organizations in Clackamas County are working to eliminate traffic fatalities and serious injuries. To most effectively accomplish this, the organizations, such as emergency medical service professionals, highway agencies, enforcement officers, transportation engineers, health officials, and private organizations should share data, understand the resources others can offer, and help each other with the challenges they are facing.

Action Items – Communication

- Continue DTZ Advisory Board and expand membership.
- Develop other forums and tools for cross-organization information sharing and communication.
- Collaborate with Clackamas County Public Health Division to work on active transportation, safe routes to school, health impact assessments, and rural access to health care.
- Include transportation safety in County public health education programming.
- Better incorporate safety into long-range planning and project development processes.
- Develop a formal method for sharing safety data with partners (such as a website or a recurring presentation).
- Collaborate with local law enforcement agencies to identify and evaluate top County crash locations.
- Continue to promote and support the Clackamas County Traffic Safety Commission.

Data Management

Data-driven approaches can help the County most effectively reduce severe crashes. Data can help the County determine where to focus its efforts to achieve the greatest reduction in severe crashes and then to determine the most effective treatments and/or programs to employ. To fully realize the potential of the data being collected, the County needs to share it across organizations and integrate it into systems where it can be effectively analyzed.

Action Items – Data Management

- Integrate Roadway Infrastructure Management Systems (RIMS), crash, and traffic databases.
- Manage assets efficiently.
- Improve data inventory elements including addition of curve data.

Safety Management

- Partner with Clackamas County Public Health Division and Center for Public Health Advancement to:
  - » Overlay substance abuse data with DUII data to identify locations to focus interventions.
  - » Overlay chronic disease impacts with transportation safety data to identify locations where interventions could be applied to reduce disease and traffic crashes (e.g., multimodal infrastructure improvements).
- Provide crash data recording training for law enforcement officers.

Safety Analysis Capacity Building

As more data becomes available, Clackamas County has an opportunity to use this new data to improve traffic safety outcomes. To do so, however, the County will need to increase its analysis capacity by hiring additional staff with data analysis skills and/or by using trainings to improve existing staff analysis skills.

Action Items – Safety Analysis

- Pursue grants to provide additional training and/or software tools.
- Plan and execute data analysis training sessions.
- Add data analysis capabilities
- Integrate the *Highway Safety Manual* (*HSM*) Predictive Method analyses into the roadway database for segments and intersections.
- Automate network screening using a custom or off-the-shelf tool.
- Support Data-Driven Approaches to Crime and Traffic Safety (DDACTS).

Safety Analysis – What Can You Do?

• Report all crashes

Enhanced Emergency Medical Services

Emergency Medical Services (EMS) provide an opportunity to stabilize the life of a person injured in a crash. They are integral to Clackamas County reaching its goal of zero fatal or serious injury crashes. The effectiveness of EMS is tied closely to the time it takes for a person injured in a crash to receive prompt medical care. Research indicates that there is a "golden hour;" total pre-hospital time over 60 minutes is associated with a rise in patient mortality[1].

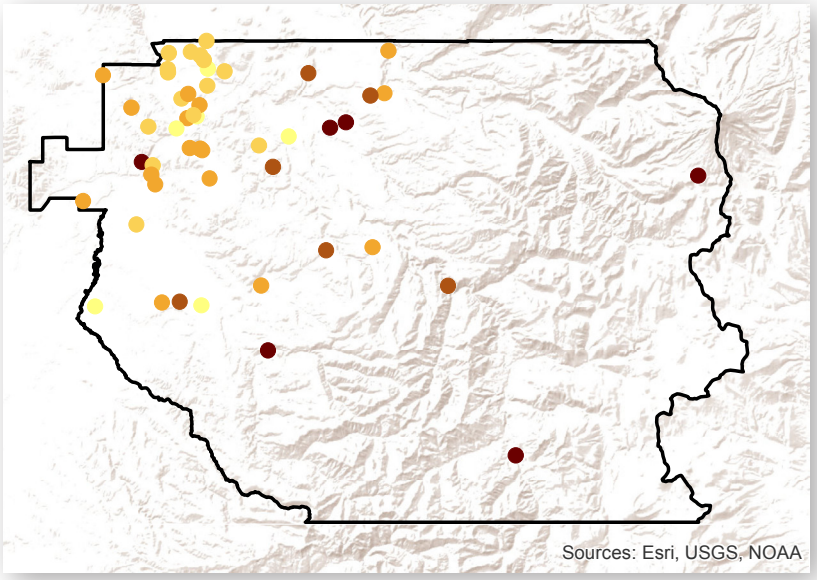
To receive prompt, high-quality medical attention, a victim with severe injuries needs to be quickly transported to a high-level trauma center. Clackamas County has no designated trauma centers and relies on trauma centers in the surrounding counties. (See map on this page for the time elapsed between a crash and the victim's arrival at the hospital for a selection of crashes in Clackamas County from 2012 to 2016.) For some rural parts of Clackamas County, prompt access to these facilities is not currently feasible.

Areas with higher response times and lower availability of trauma centers may need to rely on bystander first aid. Evidence shows that bystander aid before EMS arrival can improve patient outcomes and decrease deaths.

Action Items – Emergency Medical Services

- **Partner with local hospitals or outreach groups** to help provide bystander training courses to the public (i.e., train members of the public to respond to emergencies since they are sometimes the first on the scene at a crash and may be the only one for some time in rural areas). Opportunities for this include:
  - » Partner with hospitals offering courses, including Stop the Bleed, such as Legacy Health and Oregon Health Sciences University.
  - » Promote the Community Emergency

Source: Fatality Analysis Reporting System (FARS). National Highway Traffic Safety Administration. 2012-2016.



1 Samplais, et al. Impact of on-site care, prehospital time, and level of in-hospital care on survival in severely injured patients. 1993.

Enhanced Emergency Medical Services

Response Team (CERT) program, which trains community members in first responder skills in case emergency medical services are not immediately available in an emergency.

  - » Train local groups, such as fire departments to be trainers themselves and then offer training more frequently in their local community.
  - » Partnering with Oregon Trauma Systems program and Trauma Centers to provide this education, as trauma centers are required to provide injury prevention programs.

- **Work with the Emergency Medical Services Council** and other stakeholders to:
  - » Maximize efficiency with urban and rural response times through evidence-based techniques.
  - » Continue activation of Life Flight as requested by crews en route to crash scenes.
  - » Build advanced education EMS personnel capacity in rural areas.
  - » Identify reasons for delay in transport for both ground EMS and helicopter EMS (using registry data and EMS records.
  - » Consider process improvement initiatives to increase EMS documentation and data collection.
  - » Work with stakeholders to identify equipment upgrades, training, or enhancements that would improve patient outcomes.
  - » Identify barriers, if any, to rapid transfer of patients from lower-acuity hospitals in Clackamas County to trauma centers in Portland.
- **Support the Oregon Area Trauma Advisory Board** in their efforts to:
  - » Review patient transport time data, identify barriers to rapid transport, and work with stakeholders to find solutions.
  - » Enhance quality assurance for delivery of emergency medical services and review improvement opportunities.
  - » Continue collaboration with EMS providers as part of Drive to Zero Advisory Board and expand to other groups as necessary.
- **Enhance collaboration** between the County and rural fire districts with emphasis on unique rural needs.
- **Work with the County 911 team** to:
  - » Involve them at appropriate times in project planning and design review to identify opportunities to improve EMS access and location identification.
  - » Involve them in enforcement and EMS grant opportunities.
  - » Develop/purchase a system that allows County 911 dispatchers to quickly input reported road issues and have the information be sent to the appropriate agency (i.e., County, City, or ODOT Region).
- Consider a media campaign to inform/educate public how to help emergency vehicles move faster by slowing down and moving over.

Emergency Medical Services – What Can You Do?

- *Be aware of locations where cellular service may not exist*
- *Be aware of your location so you can provide it to EMS providers if necessary*
- *Program your phone with emergency contact information*
- *Take a first-aid or CPR course*

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MEMORANDUM

Date:	October 31, 2018	Project #: 20716
To:	Joseph F. Marek, PE, PTOE, Christian Snuffin, PE, PTOE, and Rob Sadowsky; Clackamas County	
From:	Brian L. Ray, PE, Nick Foster, and Bryan Graveline; Kittelson & Associates, Inc.	
Project:	Clackamas County Safety Action Plan Update	
Subject:	Drive to Zero Safety Action Plan - Part 2 Local Road Safety Plan (Working Draft)	

The following memorandum is a working draft of the content for Part 2 of the Drive to Zero Safety Action Plan. Items that still need to be addressed to create a complete draft of Part 2 include:

- Further information from Oregon Department of Transportation Region 1 staff on the scope of All Roads Transportation Safety (ARTS) projects that are programmed in the County. Once this information is received, the project team will compare the scope of work to the analysis completed for this plan. *Last correspondence with ODOT staff was 10/30/18.*
- Cost estimate information from Clackamas County staff for certain countermeasures. *List sent to Clackamas County on 10/25/18*.
- Formatting of the Part 2 content similar to Part 1. *Ongoing*.

PART 2 INTRODUCTION

Overview

Clackamas County has set a goal to eliminate fatal and serious injury crashes on its roads by 2035. As part of meeting this goal, the County established a two-part approach to its *Drive to Zero Safety Action Plan*. Part 1 of Clackamas County's Drive to Zero Safety Action Plan describes the broad areas the County, its partner organizations, and its residents must focus on to achieve this goal. These emphasis areas represent an evidence-based approach to reducing fatal and serious injury crashes, and they are based on a review of crash data in Clackamas County and best practices from local, national, and international sources. Part 1 contains action items for the County and its partners for each emphasis area. These emphasis areas are:

- Safe Drivers and Passengers

- Safe Infrastructure
- Safe Vehicles
- Safe Vulnerable Users
- Enhanced Emergency Medical Services
- Safety Culture
- Safety Management

Part 2 of Clackamas County's Drive to Zero Safety Action Plan builds on Part 1 to describe a data-driven Local Road Safety Plan for County-owned roadways. It includes projects to reduce fatal and severe injury crashes on road corridors and intersections. The Local Road Safety Plan is based on crash and roadway data analyses. Projects in this plan include countermeasures targeted at high crash locations, as well as treatments that can be deployed systemically throughout the county at locations with contributing factors to fatal and severe injury crashes. These projects are prioritized into a funding constrained plan that describes when the county will further investigate and implement them.

About this Plan

There are two basic approaches agencies can take to identifying locations to implement crash reduction countermeasures: 1) a location-based approach, involving analyzing crash history and road and traffic information at individual sites to identify high crash locations; and 2) the systemic approach, which involves selecting locations for countermeasures based on roadway characteristics that may be correlated with severe crashes. The Federal Highway Administration (FHWA) recommends that agencies use both approaches[1] and both are used in this plan.

Part 2 is organized in the following sections:

- Local Road Safety Plan
  - Location-specific Safety Treatments
  - Systemic Safety Treatments
  - Funding Constrained Plan
- Summary
- Data Analysis

LOCAL ROAD SAFETY PLAN

The Local Road Safety Plan is a funding-constrained plan for the next five years featuring potential location-specific projects and potential locations for the deployment of systemic countermeasures. This

[1] https://safety.fhwa.dot.gov/systemic/about.cfm

plan was informed by analyzing the top 50 high-crash sites by Safety Priority Index System (SPIS) score and conducting a systemic screening analysis to identify the roadway and environmental risk factors that potentially contribute to crashes. This two-pronged approach addresses existing locations exhibiting undesirable safety performance (i.e., crash frequency, rate, and severity history) and identifies locations where systemic safety treatments and countermeasures may prevent future severe crashes. Projects identified for specific locations are prioritized based on benefit-cost analyses.

Location-Specific Safety Treatments

The following section describes the top 50 high-crash sites and the countermeasures considered and recommended for them.

Priority Locations

Figure 1 shows the top 50 high-crash sites, based on SPIS score using crash data from 2013 to 2015. It includes 42 intersections and 8 road segments. Several of these locations overlap with areas identified as candidates for road safety audits (RSAs) in the County's Transportation System Plan (TSP), as shown in the figure.

Table 1 describes the crash patterns identified at each site. Appendix A further includes the crash data for each site.

Table 1. Site Crash Patterns

Location Number	Location Name	Prevalent Crash Patterns	Potentially included in ODOT ARTS Project List?[1]
1	Fuller Road / Johnson Creek Boulevard	Rear-end crashes	X
2	Kelso Road / Orient Drive	Angle and turning crashes	X
3	Sunnyside Road / SE 101st Avenue	Rear-end crashes	
4	Sunnyside Road / Stevens Road	Rear-end, angle, and turning crashes	
5	Webster Road / Lake Road	Angle, turning, and rear-end crashes	
6	Johnson Creek Boulevard / 80th Avenue	Angle crashes	
7	Sunnyside Road / Clackamas Town Center	Angle and turning crashes	
8	Sunnyside Road / 122nd Avenue	Rear-end crashes	X
9	King Road / 82nd Avenue	Angle, turning, and rear-end crashes	X
10	King Road / Fuller Road	Angle and turning crashes	
11	Sunnyside Road / 93rd Avenue	Turning crashes	
12	Johnson Creek Boulevard / Bell Road	Angle, turning, and rear-end crashes	
13	Sunnybrook Boulevard / Sunnyside Road	Turning and rear-end crashes	
14	Fuller Road / Harmony Road	Turning and rear-end crashes	
15	82nd Drive (s/o OR 212)	Turning crashes at driveways	
16	72nd Avenue / Luther Road	Turning crashes	
17	82nd Drive (n/o OR 212)	Angle and turning crashes	
18	Ferguson Road / Redland Road	Turning and rear-end crashes	X
19	Howlett Road / VanCuren Road	Fixed object crash (one total)	
20	Airport Road / Arndt Road	Angle, turning, and rear-end crashes	

21	Oatfield Road / Jennings Avenue	Angle, turning, and rear-end crashes	X
22	Jennings Avenue / Addie Street	Angle and turning crashes	X
23	Sunnyside Road	Fixed object and turning crashes and one pedestrian crash	
24	Bornstedt Road / Trubel Road	Angle and turning crashes	
25	Miley Road / Airport Road	Turning and fixed object crashes	X
26	Bell Avenue / Overland Street	Fixed object, angle, and turning crashes and one pedestrian crash	
27	Springwater Road / Harding Road	Angle and turning crashes	X
28	Central Point Road / New Era Road	Angle and turning crashes	X
29	Oatfield Road / Concord Road	Angle and turning crashes	X
30	Eagle Creek Road / Currin Road	Fixed object crashes	X
31	82nd Drive / Strawberry Lane	Angle and turning crashes	
32	Compton Road / Orient Road	Angle, turning, and rear-end crashes	X
33	362nd Drive (s/o Skogan Road)	Fixed object crashes and one pedestrian crash	
34	Webster Road / Strawberry Lane	Rear-end, angle, sideswipe, and fixed object crashes	
35	Causey Avenue / 85th Avenue	One fixed object, rear-end, angle, and pedestrian crash	
36	Grahams Ferry Road / Tooze Road	Angle crashes	X
37	Central Point Road	Fixed object crashes	X
38	Mulino Road	Fixed object crashes	
39	Risley Avenue / Oatfield Road	Angle, turning, and rear-end crashes	
40	Park Avenue / Oatfield Road	Angle and turning crashes	
41	Arndt Road / Barlow Road	Rear-end crashes	X
42	Childs Road / Stafford Road	Angle and turning crashes	X
43	92nd Avenue / Johnson Creek Boulevard	Rear-end and angle crashes	X
44	Hattan Road / Springwater Road	Angle and turning crashes	X
45	Johnson Creek Boulevard / Linwood Avenue	Angle and turning crashes	
46	Canby Marquan Highway / Lone Elder Road	Rear-end crashes	
47	Mountain Road	Fixed object crashes	X
48	362nd Drive (n/o Colorado Road)	Fixed object crashes	
49	Sunnyside Road / 105th Avenue	Rear-end crashes	
50	Stafford Road / Schatz Road	Angle, turning, and fixed object crashes	X

[1] Note that the project team is still gathering information regarding ODOT ARTS programmed projects and will update the report as needed after doing so.

Countermeasures Toolbox

Countermeasures from the Oregon Department of Transportation's (ODOT's) All Roads Transportation Safety (ARTS) program were considered as potential treatments for the sites analyzed for this plan. These treatments may be applicable only to sites that exhibit contributing factors potentially mitigated by the specific countermeasures. For all sites, further engineering study, including reviewing the detailed crash report narratives can help confirm the appropriateness and feasibility of specific countermeasures for a given location.

A brief description of each countermeasure and the types of locations it's proposed to be deployed at is shown below in Table 2. A full description of each countermeasure can be found in *Appendix B*.

Table 2. Countermeasure Descriptions

Treatment	ODOT ARTS Countermeasure Number(s)	Applicable Locations	Crash Patterns Addressed	Crash Reduction Factor
Roundabout	H16-17	All Intersections	Severe Crashes	78-82%
Traffic Signal	H20-21	Unsignalized Intersections	Angle Crashes[1]	67-77%
Protected Left-Turn Phasing	I4-5	Signalized Intersections	Turning Crashes	99%
Left-Turn Lanes	H7-14	All Intersections	All	7-48%
Right-Turn Lanes	H2-3	All Intersections	All	14-26%
Improve Signal Visibility	I2	Signalized Intersections	All	13-36%
Advance Intersection Warning	I8-9, I12	All Intersections	All[2]	13-36%
Shoulder Widening	RD20	Rural Roadway Segments	All	18%
Rumble Strips	RD16	Rural Roadway Segments	Severe Crashes	22%
Guardrail	H28	Rural Roadway Segments	Severe Run off the Road Crashes	47%
Curve Warning Signs	RD9	Rural Roadway Segments	Severe Crashes on Curves	13%

[1]This countermeasure has a detrimental effect on the frequency of rear-end crashes
[2]The crash reduction factor for some forms of advance intersection warning, such as flashing beacons that are coordinated with the intersection's signal, are applicable to rear-end crashes only. The factor for other forms, such as stop ahead pavement markings and signs, are applicable to all crashes.

Applying Countermeasures to Priority Locations

Countermeasures are identified for the top 50 high-crash sites based on their potential ability to address the crash patterns summarized in Table 1 and their applicability to the site's land-use, traffic, and roadway characteristics. Table 3 summarizes the recommended countermeasure for each site, along with the estimated benefit, cost, and benefit-cost (B/C) ratio of the proposed treatment. A B/C ratio greater than 1.0 indicates a treatment is expected to result in crash reduction benefits greater than the cost to implement and maintain the countermeasure(s) over the course of its service life.

Table 3. Recommended Countermeasures and BC Ratios

Location Number	Location Name	Countermeasure(s)	Estimated Benefit[1]	Estimated Cost[1]	BC Ratio
1	Fuller Road / Johnson Creek Boulevard	Improve Signal Visibility, Advance Intersection Warning	$4,061,664		
2	Kelso Road / Orient Drive	Recommend further study of effectiveness of recently implemented all-way stop control	-		
3	Sunnyside Road / SE 101st Avenue	Improve Signal Visibility	$2,510,441		
4	Sunnyside Road / Stevens Road	Improve Signal Visibility	$1,871,367		
5	Webster Road / Lake Road	Improve Signal Visibility, Protected Left-Turn Phasing, Left-Turn Lanes	$3,356,191		
6	Johnson Creek Boulevard / 80th Avenue	Recommend further study to determine appropriate and feasible countermeasures	-		
7	Sunnyside Road / Clackamas Town Center	Recommend further study to determine appropriate and feasible countermeasures	-		
8	Sunnyside Road / 122nd Avenue	Improve Signal Visibility, Advance Intersection Warning	$2,790,755		
9	King Road / 82nd Avenue	Improve Signal Visibility, Protected Left-Turn Phasing	$2,373,937		

10	King Road / Fuller Road	Recommend further study to determine appropriate and feasible countermeasures	-		
11	Sunnyside Road / 93rd Avenue	Improve Signal Visibility	$1,788,508		
12	Johnson Creek Boulevard / Bell Road	Improve Signal Visibility, Protected Left-Turn Phasing, Advance Intersection Warning	$3,217,037		
13	Sunnybrook Boulevard / Sunnyside Road	Improve Signal Visibility, Advance Intersection Warning	$2,151,867		
14	Fuller Road / Harmony Road	Improve Signal Visibility, Advance Intersection Warning	$1,925,611		
15	82nd Drive (s/o OR 212)	Recommend further study to determine appropriate and feasible countermeasures	-		
16	72nd Avenue / Luther Road	Recommend further study to determine appropriate and feasible countermeasures	-		
17	82nd Drive (n/o OR 212)	Recommend further study to determine appropriate and feasible countermeasures	-		
18	Ferguson Road / Redland Road	Right-Turn Lanes, Left-Turn Lanes	$2,309,833		
19	Howlett Road / VanCuren Road	Advance Intersection Warning	$4,841,840		
20	Airport Road / Arndt Road	Improve Signal Visibility, Protected Left-Turn Phasing, Advance Intersection Warning	$1,919,010		
21	Oatfield Road / Jennings Avenue	Improve Signal Visibility, Protected Left-Turn Phasing, Advance Intersection Warning	$2,030,216		
22	Jennings Avenue / Addie Street	Recommend further study of effectiveness of recently implemented delineators; possible future countermeasures include Turn Lanes, Roundabout, and Traffic Signal	-		
23	Sunnyside Road	Recommend further study to determine appropriate and feasible countermeasures	-		
24	Bornstedt Road / Trubel Road	Recommend further study of effectiveness of recently implemented all-way stop control	-		
25	Miley Road / Airport Road	Roundabout	$3,980,962		
26	Bell Avenue / Overland Street	Recommend further study of effectiveness of recently implemented sidewalk; also recommend further study of non-pedestrian crashes to determine appropriate and feasible countermeasures	-		
27	Springwater Road / Harding Road	Recommend further study to determine appropriate and feasible countermeasures	-		
28	Central Point Road / New Era Road	Roundabout	$1,792,097		
29	Oatfield Road / Concord Road	Improve Signal Visibility and Protected Left-Turn Phasing	$2,586,090		
30	Eagle Creek Road / Currin Road	Roundabout	$6,961,319		
31	82nd Drive / Strawberry Lane	Traffic Signal	$3,032,789		
32	Compton Road / Orient Road	Recommend further study of effectiveness of recently implemented all-way stop control	-		
33	362nd Drive (s/o Skogan Road)	Guardrail, Rumble Strips, and Shoulder Widening	$1,905,983		
34	Webster Road / Strawberry Lane	Advance Intersection Warning	$874,985		
35	Causey Avenue / 85th Avenue	Recommend further study to determine appropriate and feasible countermeasures	-		
36	Grahams Ferry Road / Tooze Road	Recommend further study to determine appropriate and feasible countermeasures	-		
37	Central Point Road	Rumble Strips, Shoulder Widening	$4,352,025		

38	Mulino Road	Shoulder Widening	$906,807		
39	Risley Avenue / Oatfield Road	Left-Turn Lanes, Traffic Signal	$923,852		
40	Park Avenue / Oatfield Road	Recommend further study to determine appropriate and feasible countermeasures	-		
41	Arndt Road / Barlow Road	Roundabout	$1,792,097		
42	Childs Road / Stafford Road	Roundabout	$2,389,463		
43	92nd Avenue / Johnson Creek Boulevard	Improve Signal Visibility, Advance Intersection Warning	$1,099,835		
44	Hattan Road / Springwater Road	Roundabout	$6,667,404		
45	Johnson Creek Boulevard / Linwood Avenue	Protected Left-Turn Phasing, Advance Intersection Warning	$1,913,248		
46	Canby Marquan Highway / Lone Elder Road	Left-Turn Lanes	$1,185,295		
47	Mountain Road	Guardrail, Curve Warning Signs, Shoulder Widening	$3,571,713		
48	362nd Drive (n/o Colorado Road)	Guardrail, Rumble Strips, Shoulder Widening	$5,306,455		
49	Sunnyside Road / 105th Avenue	Improve Signal Visibility	$982,720		
50	Stafford Road / Schatz Road	Roundabout	$5,712,191		

[1]Estimated benefits and costs are calculated over the expected service life of the countermeasure(s)

Systemic Safety Treatments

Systemic safety treatments are meant to be deployed at locations with identified corresponding risk factors for fatal and severe injury crashes. These locations may, or may not, have a history of severe crashes, but have characteristics that are similar to other sites where they have occurred. The County may be able to reduce risk of fatal and severe injury crashes occurring by proactively deploying the countermeasures described in this section systemically across locations with the characteristics identified in the systemic network screening analysis, which is described in Appendix A.

Part 1 of the plan identified the top seven most frequent contributing factors to fatal and serious injury crashes: Inexperienced Drivers, Roadway Departures, Aggressive Driving, Motorcyclists, Alcohol/Drugs, Senior Drivers, and Pedestrians and Bicyclists. It also identified several action items to reduce crashes in each of these areas; though it did not describe specific infrastructure treatments and locations. The systemic network screening analysis was able to use available data to further evaluate contributing factors to roadway departure and pedestrian and bicycle crashes. This section builds on Part 1 by describing specific infrastructure countermeasures that could be deployed systemically to reduce roadway departure crashes and crashes involving people walking and bicycling.

Priority Locations

The systemic network screening analysis identified the following as priority locations for systemic treatments:

- Roadway Departure Crashes – Two-lane, rural roads with limited shoulders (i.e., less than four feet wide) and speeds of 45 miles-per-hour (MPH) or greater. These locations are shown in Figure 2.
- Bicycle and Pedestrian Crashes – Roads with speeds of 30 MPH or greater. Further priority could be given to urban areas near likely generators of walking and biking activity. Urban roads with speeds of 30 MPH or greater are shown in Figure 3.

Systemic Countermeasures Tool Box

The following countermeasures could be deployed systemically at locations with contributing factors identified in the Systemic Screening section. These countermeasures can be installed as part of safety-focused projects, as part of capital projects, or, in some cases, as part of routine maintenance work (e.g., installing shoulder rumble strips when repaving a higher speed two lane road with narrow shoulders if the surrounding land-use context is appropriate,).

Roadway Departure Crashes

Table 4 shows countermeasures the County could deploy systemically to reduce roadway departure crashes. These come from ODOT's ARTS Program.

Table 4. Systemic Countermeasures

Treatment	Crash Patterns Addressed	Crash Reduction Factor
Shoulder Widening	All	18%
Rumble Strips	Severe Crashes	22%
Guardrail	Severe Run off the Road Crashes	47%
Post-Mounted Delineators on Curves	Curve Crashes at Night	30%
High-Friction Surface Treatments	Wet Road Crashes	57%

ODOT's ARTS programs contains other roadway departure focused countermeasures that may also be applicable. Further, ODOT completed a statewide roadway departure plan, *Oregon Roadway Departure Implementation Plan Update*, in 2017, that identifies locations in Clackamas County for roadway departure focused treatments. These locations are listed in Appendix C.

Bicycle/Pedestrian Crashes

Part 1 contains action items to reduce the frequency and severity of crashes involving people walking and biking. The infrastructure related items in Part 1 are broadly targeted at providing appropriate crossing treatments and separation between motor vehicles and people walking and biking and selecting and designing for appropriate speeds on streets where people are likely to be walking and biking. Building off these action items and the systemic screening analysis described in Appendix A, the following are countermeasures the County could deploy systemically to reduce bicycle and pedestrian crashes. Most of these come from ODOT's ARTS Program:

- Provide an appropriate level of separation between people driving and biking based on roadway and traffic characteristics through bike lanes, buffered bike lanes and cycle tracks. The Clackamas County Active Transportation Plan[1] provides a toolkit for determining the most suitable bicycle facility for a roadway based on its functional classification, motor vehicle speed, and motor vehicle volume.
- Provide sidewalks along roads to separate people walking and people driving
- Install enhanced crossing treatments at unsignalized intersections where warranted, such as:
    - Rectangular rapid flashing beacons
    - Pedestrian refuge islands
    - Crosswalk markings and signs
    - Curb extensions
    - Pedestrian hybrid beacons
- Implement signal timing and phasing treatments at signalized intersections where warranted, such as:
    - Leading pedestrian interval
    - No pedestrian phase feature with flashing yellow arrow (County has done this at many locations already)
    - Bike signals

Applying Systemic Countermeasures to Priority Locations

The locations shown in Figures 2 and 3 will need to be further evaluated to select the specific countermeasure(s) that may be most appropriate and feasible for each location. For roadway departure crashes, this could include prioritization locations with the greatest number of contributing factors and then completing field and engineering reviews of each location. For bicycle and pedestrian crashes, this could include further prioritization of the sites shown in Figure 3, including prioritizing locations near likely generators of pedestrian and bicycle activity and areas with a history of pedestrian and bicycle crashes. Finally, the County could also develop a standardized procedure for evaluating intersections for appropriate crossing treatments and roadway segments for appropriate bicycle facility treatments.

Funding Constrained Plan

The County expects to have approximately $1 million/year over the next five years to spend on safety-focused projects. The following section describes how the County expects to allocate these funds to the location-specific and systemic treatments described in the previous section. It assumes that the County will allocate approximately XX% of its budget to implementing the systemic treatments.

Location-Specific Treatments

The location-specific treatments are prioritized based on their benefit-cost ratios, shown previously in Table X. Table Y summarizes the plan for implementing these treatments over the next five years, based

on this prioritization, the assumed cost of each location, and an assumed annual budget of $750,000 per year for the next five years for these projects.

Table 5. Project Prioritization

Project Priority	Location	Countermeasure(s) Applied	Benefit Cost Ratio	Cost
Year 1 (2020)				
1				
2				

Details on the funding constrained plan will go here, including a note that this plan includes a set-aside for systemic countermeasures, which are described below.

Systemic Treatments

The County will set-aside approximately XX% of its budget for safety-focused projects to implement the systemic treatments described previously. Treatment locations will need to be further prioritized and countermeasures selected as described in the previous section.

SUMMARY