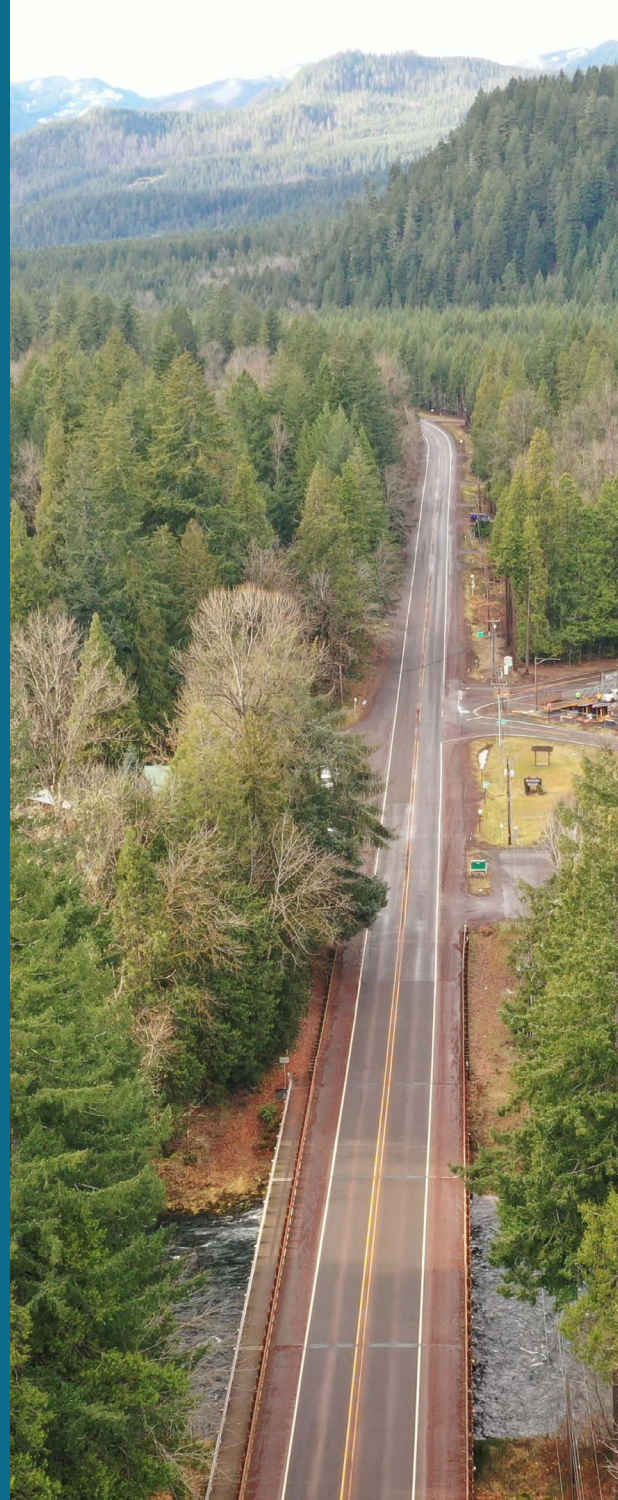


OR 126 EAST MCKENZIE HIGHWAY SAFETY STUDY

JANUARY 2024



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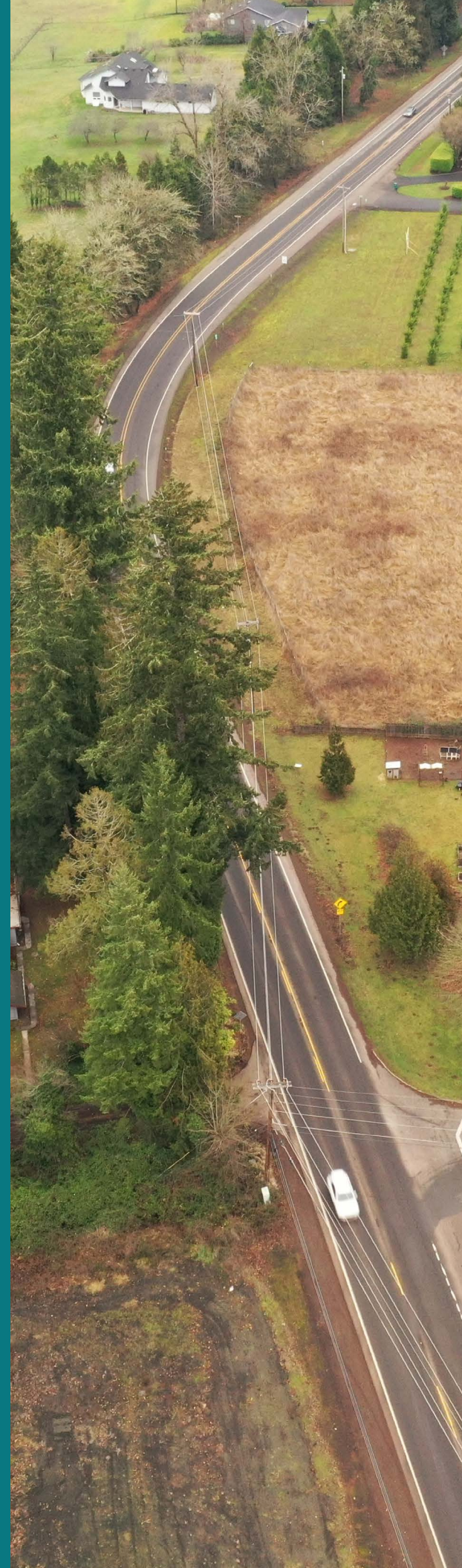
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1.0 » EXECUTIVE SUMMARY



THE GOAL OF THE OR 126 EAST MCKENZIE HIGHWAY SAFETY STUDY IS TO IDENTIFY LOW-COST, HIGH-BENEFIT SAFETY SOLUTIONS ON THE OR HIGHWAY 126 EAST CORRIDOR BETWEEN THE SPRINGFIELD CITY LIMITS (IN LANE COUNTY) AND US 20 (IN LINN COUNTY).

OR 126 EAST IS ALSO KNOWN AS MCKENZIE HIGHWAY. THERE ARE TWO DIFFERENT SECTIONS. THE SECTION BETWEEN SPRINGFIELD AND OR 242 (THE OLD MCKENZIE HIGHWAY) IS CALLED MCKENZIE HIGHWAY #15. THE SECTION BETWEEN OR 242 AND US 20 IS CALLED CLEAR LAKE-BELKNAP SPRINGS HIGHWAY #215.

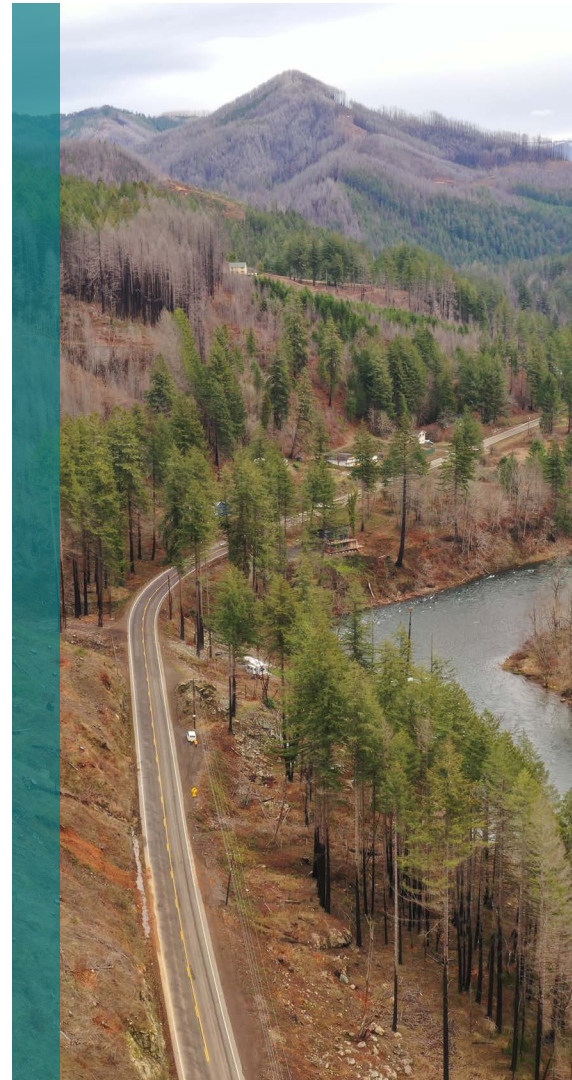
This report summarizes the project team’s efforts to select appropriate solutions and countermeasures for the OR 126 East corridor. Recommended solutions are presented in three different categories.

- 1 Location-specific countermeasures are shown for a set of safety focus areas that have unique characteristics and an increased risk of crashes.**
- 2 Corridor-wide solutions are those that can be applied to many locations along the highway that have similar safety needs.**
- 3 A Small Community Toolbox provides a wide range of safety solutions to address safety needs and concerns in the various small rural communities along OR 126 East.**

The final list of recommended solutions emphasizes low-cost, high-benefit countermeasures that could be implemented within the next five years. However, higher-cost, longer-term solutions are listed at some locations where there is a clear need and safety benefit.

SOME OF THE RECOMMENDED LOW-COST SAFETY SOLUTIONS INCLUDE:

- » Improving signing and pavement markings (striping)
- » Removing visual obstructions at intersections to improve sight distance
- » Installing post-mounted delineators
- » Installing speed feedback signs



2.0 » STUDY AREA



THE OR 126 EAST STUDY AREA IS 66 MILES LONG, EXTENDING FROM THE EASTERN CITY OF SPRINGFIELD LIMITS (IN LANE COUNTY) TO THE JUNCTION WITH US ROUTE 20 (IN LINN COUNTY).

As shown in Figure 1, the study area spans these two Oregon Department of Transportation (ODOT) highways (from west to east):

1 McKenzie Highway #15
 MP 8.81 (Springfield City limits) to MP 55.00 (Junction with OR 242)

2 Clear Lake-Belknap Springs Highway #215
 MP 19.81 (Junction with OR 242) to MP 0.00 (Junction with US 20)

FIGURE 1. OR 126 EAST STUDY AREA



The entire 46-mile McKenzie Highway segment and the first seven miles of the Clear Lake-Belknap Springs Highway segment are located in Lane County. The remainder of the Clear Lake-Belknap Springs Highway segment extending to the US Route 20 junction, approximately 13 miles, is located in Linn County.

OR 126 East is the primary travel route through the McKenzie River valley. It is a two-lane undivided

highway carrying approximately 12,000 vehicles per day (vpd) on the west end and 3,000 vpd at the east end. There are many small rural communities located along the McKenzie Highway segment (shown in Figure 1). Along the Clear Lake-Belknap Springs segment, there are no small communities, but the highway provides access to several campgrounds and popular trailheads.

OR 126 East is classified as a Statewide Highway in the Oregon Highway Plan (OHP). It is also classified as a National Freight Route, High Clearance Route, and a Reduction Review Route. In addition, there are two National Scenic Byways (West Cascade Scenic Byway and McKenzie Pass-Santiam Pass Scenic Byway) and one state scenic byway (McKenzie Bridge Scenic Byway) in the study area.

BIKE AND PEDESTRIAN TRAVEL

Within the study area, there are no marked bicycle lanes and very few sidewalks.

Most sidewalks are near transit stops. The Lane Transit District (LTD) Route 91 serves the communities of Walterville, Leaburg, Vida, Nimrod, Finn Rock, Blue River, McKenzie Bridge, and the McKenzie River Ranger Station. Sidewalks are also provided on several bridges in

the study area, however these walkways are not accessible to people with mobility challenges because they are often narrow, lack curb ramps, and do not connect to other sidewalks.

Despite the absence of bike lanes, the section of OR 126 East from the junction with OR 242 east to the intersection with Belknap Hot Springs is part of the McKenzie Pass Scenic Bikeway.

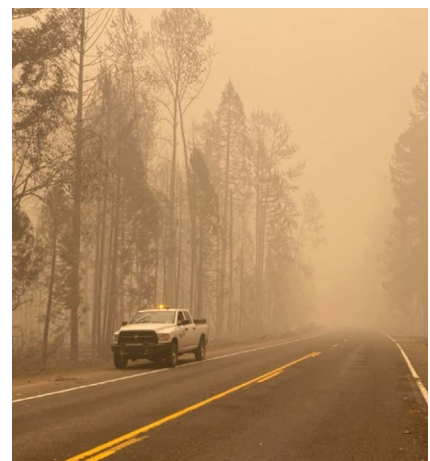
As is typical on rural roadways, people riding bicycles are expected to travel on the highway's shoulder. Most of the study area has shoulders ranging from two to four feet wide, though shoulders as wide as eight feet are present in some locations. The segment near Blue River and McKenzie Bridge has the widest shoulders in the study area (MP 39.5 to MP 54.3).

HOLIDAY FARM FIRE

In early September 2020, the Holiday Farm Fire devastated the area surrounding McKenzie Highway for a 22-mile stretch (MP 24 to MP 46), shown in Figure 2. Not only did the fire destroy homes and impact livelihoods in McKenzie River communities, the fire also drastically changed the character of the highway and landscape. Homes and businesses were demolished.

Cleanup crews removed about 10,000 damaged trees in the aftermath of the fire. The absence of buildings and dense forest has contributed to drivers traveling at higher speeds. Also, with fewer trees near the roadway, the steep cliffs and ravines present a greater risk to drivers who accidentally leave the roadway.

FIGURE 2. CONDITIONS ON OR 126 EAST MCKENZIE HIGHWAY DURING THE HOLIDAY FARM FIRE



Source: Oregon Department of Transportation

3.0 » COMMUNITY ENGAGEMENT

THIS IS ONLY A STUDY. IT IS NOT A FACILITY PLAN THAT WOULD REQUIRE FORMAL ADOPTION BY LANE COUNTY AND THE OREGON TRANSPORTATION COMMISSION. HOWEVER, THE PROJECT TEAM ENGAGED WITH THE COMMUNITY IN SEVERAL WAYS THROUGHOUT THE PROJECT, SIMILAR TO WHAT WOULD BE DONE FOR A FACILITY PLAN. THE FOLLOWING SECTIONS DESCRIBE THE PEOPLE AND EVENTS THAT HELPED GUIDE THIS STUDY.



PROJECT TEAM

PROJECT MANAGEMENT TEAM

ODOT and Lane County partnered to develop this safety study. A project management team (PMT) comprised of the ODOT project manager (Bill Johnston), the consultant’s project manager (Lacy Brown), and the Lane County transportation planner (Becky Taylor) met twice a month to oversee the project.

TECHNICAL ADVISORY COMMITTEE

In addition to the project management team, other representatives from the leading agencies provided technical expertise as part of the Technical Advisory Committee (TAC). The TAC met three times over the course of the project.

THE TAC WAS COMPRISED OF REPRESENTATIVES FROM:

Lane County

- » Transportation
- » Land Management
- » Parks

ODOT

- » Roadway
- » Environmental
- » Geotechnical
- » Traffic Safety Investigations
- » Traffic Operations

COMMUNITY ENGAGEMENT

Several groups, organizations, and individuals collaborated with the project team to guide the project and provide valuable feedback. These groups were essential in creating a better understanding of the key concerns for people who travel on OR 126 East.

STAKEHOLDER ADVISORY COMMITTEE

The Stakeholder Advisory Committee (SAC) represented a range of interests. Members included people who live, work, and travel on OR 126 East. The SAC met three times over the course of the project to provide valuable input and guidance to the project team.

THE SAC WAS COMPRISED OF REPRESENTATIVES FROM:

» **Travel Lane County** – tourism

» **Locals Helping Locals** – post-fire recovery (non-profit)

» **McKenzie Fire & Rescue** – emergency services

» **Greater Eugene Area Riders (GEARS)** – bicycling advocacy group

» **Weyerhaeuser** – trucking and forestry

» **ODOT**

» **Local area residents**

PUBLIC OPEN HOUSE EVENTS

OPEN HOUSE #1

The purpose of Open House #1 was to gather input from the community and better understand the safety concerns on OR 126 East. To reach as many people as possible, the project team hosted both an in-person and an online open house event. Open House #1 was advertised via emails, news articles, social media posts, flyers at community gathering places, and a local radio station announcement.

The online portion of Open House #1 was open to the public for two weeks on the project website in late January through early February 2023. The in-person portion of Open House #1 took place on February 4, 2023 at the McKenzie Fire & Rescue Training Center in Leaburg. In total, more than 200 people participated in the online event and approximately 50 people attended the in-person event. A total of 178 written comments were submitted.

OPEN HOUSE #2

The purpose of Open House #2 was to present the safety focus areas and potential safety solutions identified by the project team. Open House #2 was primarily an online event. It was advertised via emails, social media posts, postcards, and a local radio station announcement. The online event was open to the public on the project website for three weeks in July 2023. In total, there were over 120 unique visitors to the website. Only one person left a comment.

In addition to the online event, ODOT hosted an in-person event at the McKenzie Fire & Rescue Training Center on July 13, 2023. The meeting covered multiple ODOT-led projects in the area, including this safety study. Approximately 20 people attended this meeting.



COMMUNITY FEEDBACK

The project team reviewed all feedback provided by members of the TAC, SAC, and the general public. Comments were tagged as being either general safety concerns or concerns at specific locations. The following sections summarize some of the most common safety concerns.

GENERAL COMMENTS

- » Drivers speed and pass other vehicles unsafely. Many people suggested lowering speed limits, widening shoulders, adding slow-moving vehicle turnouts, adjusting passing lane locations, and increasing speed enforcement.
- » Vehicles turning into driveways (both right and left turns) are at risk of being rear-ended. Many people suggested widening road shoulders and adding turn lanes.
- » Narrow road shoulders, lack of sidewalks, and lack of lighting make the highway unsafe for bicyclists, pedestrians, and people taking transit.

LOCATION-SPECIFIC COMMENTS

- » **Deerhorn Road Intersection:** Many crashes have occurred at this location, some resulting in fatalities and serious injuries. People reported concern for getting rear-ended when traveling westbound on OR 126 East and turning left onto Deerhorn Road. Many people suggested installing a protected left turn lane or center turn lane, adding warning signs, and widening the travel lane.
- » **Walterville Canal Bridge:** The bridge's narrow width and tall curb have resulted in many crashes. Many people suggested removing the tall curb, widening the travel lane, adding warning signs, and lowering the speed limit on this segment of the highway.
- » **Holden Creek Lane Intersections:** People reported that there is a high risk of crashes when turning into and out of both entrances of Holden Creek Lane, especially the western entrance, due to the absence of turn lanes and limited visibility. Many people suggested adding turn lanes and lowering the speed limit on this segment of the highway.
- » **Leaburg Hydroelectric Dam Spillway:** This location has a high risk of crashes due to a sharp curve and narrow shoulders. Many people suggested lowering the speed limit on this segment of the highway.
- » **Goodpasture Road Intersection:** The covered bridge on Goodpasture Road restricts visibility between Goodpasture Road and OR 126 East. In addition, the bridge is only wide enough for one lane of traffic. Many people suggested adding warning signs and lowering the speed limit on this segment of the highway.
- » **Ben and Kay Dorris County Park:** This location has a high risk of run-off-the-road crashes because the shoulder is very narrow. In addition, there is a steep drop-off on the eastbound shoulder and no guardrail. This segment of OR 126 East was especially altered by the Holiday Farm Fire because numerous trees were removed. Many people suggested adding guardrail on this segment of the highway.

4.0 » SAFETY EVALUATION



THE PROJECT TEAM CONDUCTED A COMPREHENSIVE SAFETY ANALYSIS OF THE OR 126 EAST STUDY AREA. THE FOLLOWING SECTIONS SUMMARIZE THE KEY FINDINGS RELATING TO CORRIDOR CRASH TRENDS AND IDENTIFICATION OF HIGH-CRASH LOCATIONS.

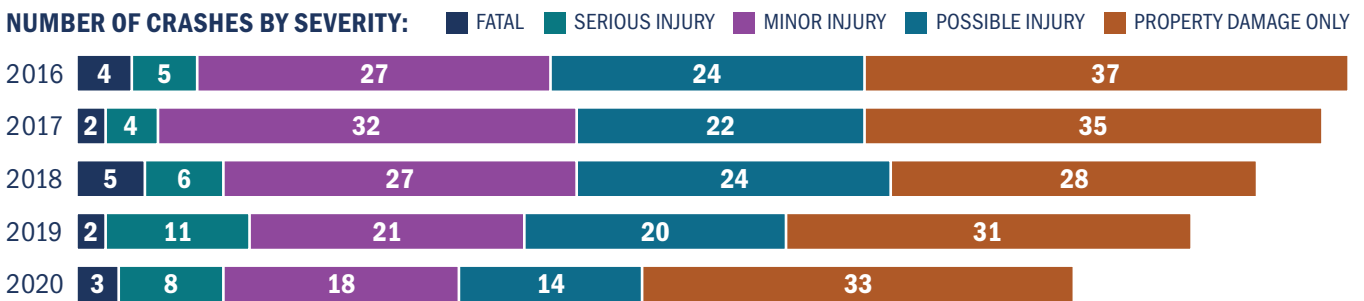
CRASH DATA OVERVIEW

BASED ON ODOT CRASH DATA FROM 2016-2020 WITHIN THE MCKENZIE HIGHWAY (OR 126 EAST) STUDY AREA:

443 
TOTAL CRASHES OCCURRED

89 
CRASHES PER YEAR, ON AVERAGE

3 
FATAL OR SERIOUS INJURY
CRASHES PER YEAR, ON AVERAGE




PERCENTAGE OF MOST COMMON CRASH TYPES
(ANY SEVERITY)

45% **17.8%** **16.3%**
FIXED OBJECT REAR-END FIXED OBJECT

PERCENTAGE OF MOST COMMON CRASH TYPES
(FATAL AND SERIOUS INJURY)

45.6% **16%** **12%**
FIXED OBJECT HEAD-ON TURNING MOVEMENT

CRASH TRENDS IN RURAL COMMUNITIES

40% 
ABOUT 40 PERCENT OF
ALL REPORTED CRASHES
HAPPENED WITHIN SMALL
RURAL COMMUNITIES

The crashes in the rural communities happened more often at intersections and driveways and involved more turning, rear end, and sideswipe collisions than the rest of the study area. A high percentage of crashes in small communities involved impairment (more so than in the rest of the study area).

Because many of these communities face similar challenges, a Small Community Toolbox was developed. The toolbox describes safety solutions that could be installed to address these common safety concerns. See the [Appendix](#) for more information.

CRASH LOCATION FOCUS AREA DETERMINATION

After studying overall crash trends for the corridor, the project team selected the highest priority safety focus areas. This involved evaluating high-risk locations using multiple methods. Crashes are rare and random events, with many contributing factors. Evaluating crash history using multiple methods provides a more complete understanding of the complex safety issues on OR 126 East. The following sections describe this process in more detail.

FATAL AND SERIOUS INJURY CRASHES

Locations where crashes occurred that resulted in fatal and serious injury were flagged for further evaluation as safety focus areas. Focusing on these types of crashes is a high priority the project team looks for solutions to decrease the risk of high-severity crashes on the study corridor.

ODOT SAFETY PRIORITY INDEX SYSTEM LOCATIONS

The Safety Priority Index System (SPIS) is a ranking system developed by ODOT to identify and compare the safety performance of state highways. ODOT develops SPIS scores based upon crash frequency, crash severity, and crash rate for segments along state highways over a rolling three-year window. Every year, the SPIS is updated with the most recent three years of crash data. The SPIS is valuable for this safety study because it compares the OR 126 East corridor with all of Oregon's highways. The last three years of SPIS sites were reviewed.

EQUIVALENT PROPERTY DAMAGE ONLY EVALUATION

The Equivalent Property Damage Only (EPDO) evaluation method accounts for crash frequency and crash severity. To complete the EPDO evaluation, the corridor was divided into segments, and each crash was assigned an

EPDO score based on the level of injury severity and relative societal cost. For example, fatal and serious injury crashes are weighted 100 times more costly than PDO crashes. The EPDO scores of all crashes within each segment were then added together. The 90th percentile EPDO score was calculated to flag segments with the highest number and severity of crashes.

CRITICAL CRASH RATE

Crash rates are another indicator of safety performance that accounts for crash frequency and traffic volume. Crash rates were determined at select locations and compared with ODOT's statewide crash rates for similar locations. The purpose of comparing the calculated crash rates with ODOT's critical crash rates is to identify sites where crashes occur at a higher frequency than expected. These segments were flagged for further consideration of safety focus areas.

SAFETY FOCUS AREAS

After evaluating crash locations, reviewing community concerns, and consulting with the project team, the safety focus areas shown in Table 2 were selected. The safety focus areas are listed from west to east, and the reason(s) for selection are noted in the last column.

TABLE 1. FOCUS AREA SUMMARY

LOCATION	TYPE	MILE POINT	SAFETY FLAGS
OR 126/ DEERHORN ROAD	Intersection	11.32	<ul style="list-style-type: none"> » Public Concern » Fatal or Serious Injury Crash History » SPIS Location » EPDO » Exceeds Critical Crash Rate
OR 126/ WALTERVILLE CANAL BRIDGE	Segment	12.90-13.15	<ul style="list-style-type: none"> » Public Concern » Fatal or Serious Injury Crash » EPDO
OR 126/ ROSS LANE	Intersection	15.61	<ul style="list-style-type: none"> » Fatal or Serious Injury Crash » SPIS Location » EPDO
OR 126/HOLDEN CREEK LANE (WEST ENTRANCE)	Intersection	17.66	<ul style="list-style-type: none"> » Public Concern
OR 126/HOLDEN CREEK LANE (EAST ENTRANCE)	Intersection	19.02	<ul style="list-style-type: none"> » Public Concern » Fatal or Serious Injury Crash » EPDO
OR 126/ LEABURG DAM SPILLWAY	Segment	19.15-19.40	<ul style="list-style-type: none"> » Public Concern » Fatal or Serious Injury Crash
OR 126/ JOHNSON CREEK ROAD	Intersection	19.97	<ul style="list-style-type: none"> » Fatal or Serious Injury Crash
OR 126/ GOODPASTURE ROAD	Intersection	25.53	<ul style="list-style-type: none"> » Public Concern » Exceeds Critical Crash Rate
BEN & KAY DORRIS COUNTY PARK	Segment	29.15-30.05	<ul style="list-style-type: none"> » Public Concern

SMALL COMMUNITIES

There are nine small unincorporated communities along the corridor. (Refer to Figure 1.) These communities have a higher density of homes and businesses compared to the rest of the corridor. There is a high level of public concern for safety in these small communities. On the rural segments of the highway, safety concerns are mostly focused on drivers leaving their lane or the roadway, as well as potential conflicts at major intersections. Within these small communities, however, the safety challenges are more complex as regional traffic on the highway mixes with local residents driving, walking, and biking to their homes, work places, schools, and other local destinations. Identifying solutions for small communities is a top priority.

Crash history shows several fatal and serious injury crashes within the small communities between 2016 and 2020, many of which occurred at driveways or minor streets. Vehicles traveling at different speeds (referred to as speed differential) increases the risk for a collision to occur, and for that collision to be more severe. In these small communities, there is a greater speed differential between through traffic on OR 126 East and vehicles turning in and out of driveways and side streets, which creates daily conflicts for people traveling between their homes and community centers. In addition to safety concerns for drivers, there are also more people walking and biking in small communities. When they are involved in a crash with a vehicle, it often results in severe injuries.



SMALL COMMUNITY TOOLBOX

Community members have expressed specific concerns related to passing lanes and passing zones, conflicts at driveways and intersections, and general risky driving behaviors (including speeding, aggressive driving, and impairment). These and other safety needs are addressed in the Small Community Toolbox, located in the Appendix.

STRATEGIES FOR IMPROVING SAFETY IN SMALL COMMUNITIES ALONG OR 126 EAST



GATEWAY SIGNS



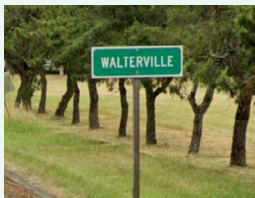
STOP-CONTROLLED INTERSECTION UPGRADES



BIKE LANES



CROSSWALKS



COMMUNITY GUIDE SIGNS



ACCESS MANAGEMENT



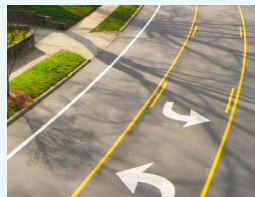
SIDEWALKS



RAISED MEDIANS



COMMUNITY EDUCATION CAMPAIGNS



TWO-WAY LEFT-TURN LANES



WIDEN SHOULDERS



LANE NARROWING

Photo Sources: **Gateway Signs** > <https://www.monroewa.gov/1015/GatewayWayfinding-Signs>, **Community Guide Signs** > Google Maps Street View, **Community Education Campaigns** > Adobe Stock, **Stop-Controlled Intersection Upgrades** > Adobe Stock, **Access Management** > Adobe Stock, **Two-Way Left-Turn Lanes** > <https://www.epermitted.com/drivers-education/center-turn-lane>, **Bike Lanes** > <https://odotopenhouse.org/oregon-coast-bike-route>, **Sidewalks** > <https://ruralsdesignguide.com/physically-separated/sidewalk>, **Widen Shoulders** > Adobe Stock, **Crosswalks** > <https://azdot.gov/business/transportation-systems-management-and-operations/operational-and-traffic-safety/az-step-5>, **Raised Medians** > https://safety.fhwa.dot.gov/ped_bike/tools_solve/medians_brochure/, and **Lane Narrowing** > <https://nacto.org/publication/urban-street-design-guide/street-design-elements/curb-extensions/>.

STRATEGIES FOR IMPROVING SAFETY IN SMALL COMMUNITIES ALONG OR 126 EAST, CONT.



DELINEATOR SPACING



“SLOW” PAVEMENT MARKINGS



SPEED FEEDBACK SIGNS



CONSISTENT SPEED LIMITS AMONG SMALL COMMUNITIES



OPTICAL SPEED BARS



POSTED SPEED ON PAVEMENT



EVALUATION OF POSTED SPEED LIMITS



ENFORCEMENT PULL-OUTS



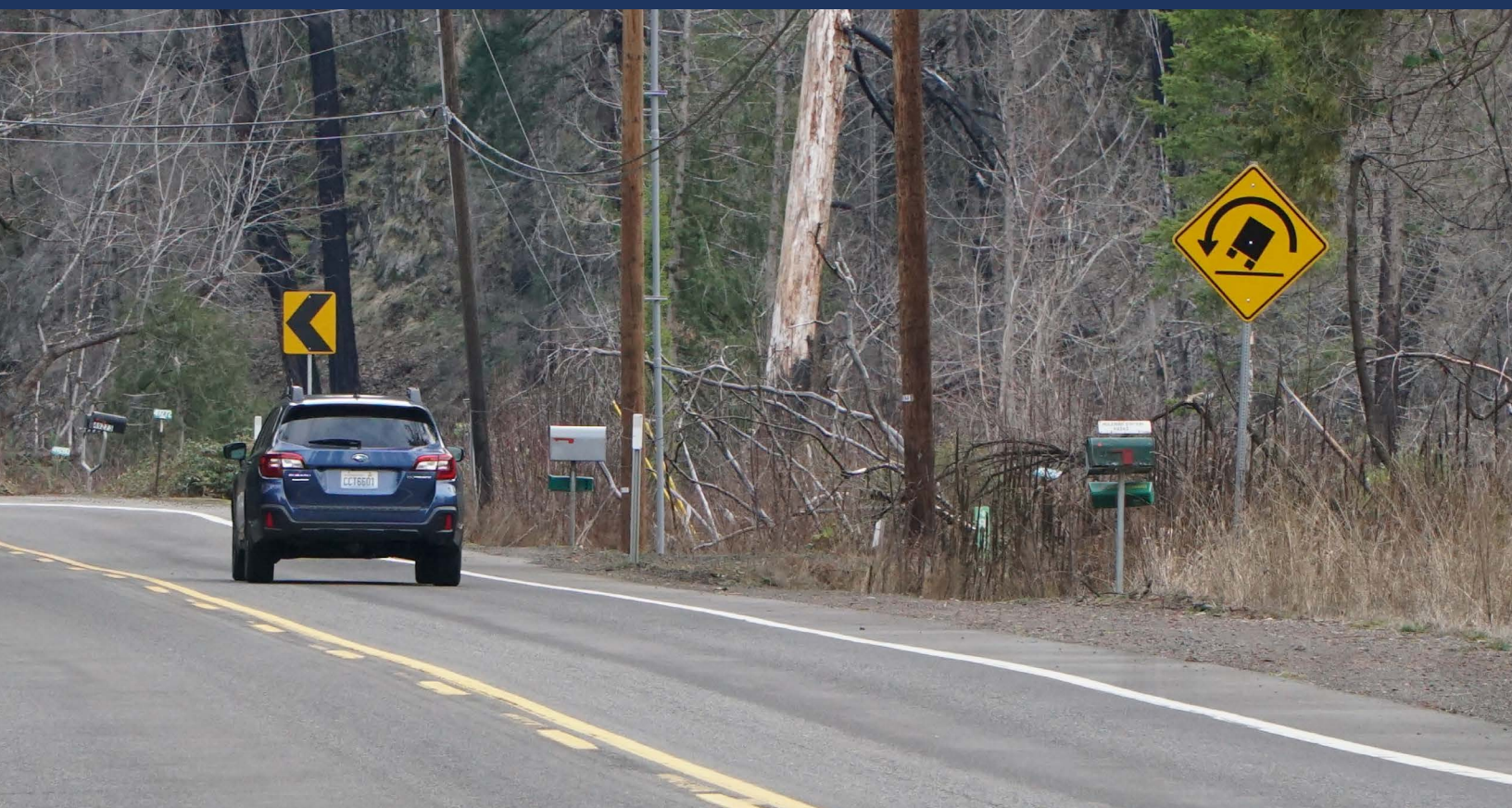
TRANSVERSE RUMBLE STRIPS



SPEED LIMIT SIGN SUPPLEMENTS

Photo Sources: **Delineator Spacing** > <https://www.treetopproducts.com/ground-mount-flexible-delineator>, **Optical Speed Bars** > <https://www.fhwa.dot.gov/publications/research/safety/15030/009.cfm>, **Transverse Rumble Strips** > <https://www.fhwa.dot.gov/publications/research/safety/hsis/12047/index.cfm>, **“Slow” Pavement Markings** > <https://ctre.iastate.edu/research-synthesis/rural-speed-management/pavement-markings/legends/>, **Posted Speed on Pavement** > <https://www.fhwa.dot.gov/publications/research/safety/15030/009.cfm>, **Speed Limit Sign Supplements** > Adobe Stock, **Speed Feedback Signs** > <https://www.marini.com/2019/12/22/marin-tries-new-speeding-deterrent-portable-detectors/>, **Evaluation of Posted Speed Limits** > Adobe Stock, **Consistent Speed Limits Among Small Communities** > <https://sdotblog.seattle.gov/2020/07/22/lower-25mph-speed-limit/>, **Enforcement Pull-Outs** > Adobe Stock.

5.0 » RECOMMENDED SOLUTIONS



THIS SECTION DESCRIBES THE RECOMMENDED SOLUTIONS TO ADDRESS THE SAFETY CONCERNS ALONG THE CORRIDOR. IT ALSO BRIEFLY DESCRIBES HOW THE RECOMMENDED IMPROVEMENTS WERE SELECTED.

As described in Chapter 1, roadway improvements that address a safety concern are sometimes referred to (by engineers) as safety solutions (which include a wider range of improvements) or countermeasures (which are specific engineering safety solutions).

Location-specific solutions for safety focus areas are presented in Table 3. Corridor-wide solutions are presented in Table 4. More detailed information is provided for two of the safety focus areas – the Deerhorn Road intersection, and the section of highway near Ben & Kay Dorris County Park.

IDENTIFYING APPROPRIATE COUNTERMEASURES

Countermeasures were selected based on their effectiveness, in terms of safety benefit. The project team also gave some consideration to the feedback received from the public. (Public input was primarily used to identify the focus areas described in Section 4.)

ODOT uses a specific method to identify the countermeasures that will reduce the risk of crashes the most. The following is a summary of the method. Additional explanation is provided in the technical memos that were prepared for this study. Refer specifically to memos 2, 3 and 4.

HIGHWAY SAFETY MANUAL PREDICTIVE METHOD

The Highway Safety Manual (HSM)¹ establishes standard methods that public agencies use to evaluate the safety performance of roadways. The HSM's predictive method is a cornerstone of the manual. The predictive method estimates the expected average crash frequency on a roadway using a combination of site characteristics and historical crash data.

For the OR 126 East corridor, the project team performed an HSM predictive analysis to determine whether any safety focus areas had a crash frequency higher than expected. Then, the analysis assigns a measurable reduction in crashes to a countermeasure by estimating the expected crash frequency with and without the countermeasures.

Results from the HSM existing conditions analysis showed that every safety focus area has a higher frequency of observed crashes than expected. The crash frequency is more than twice what was expected at four locations: both entrances of Holden Creek Lane, Johnson Creek Road, and Goodpasture Road.

Per the predictive analysis, the three projects that would provide the best safety benefit are installing a roundabout at OR 126 East & Deerhorn Road, installing an actuated flashing beacon triggered by approaching vehicles at OR 126 East & Goodpasture Road, and installing guardrail and curve warning treatments near Ben and Kay Dorris County Park.

1 Highway Safety Manual, American Association of State Highway and Transportation Officials, 2010.

LOCATION-SPECIFIC COUNTERMEASURES

This section describes the location-specific countermeasures. The corridor-wide countermeasures are described separately in the following section.

Note that there are several possible countermeasures (solutions) that could be employed to address the safety concerns at each location. The solutions *highlighted in blue italic* are the most feasible solutions to be implemented in the next five years, accounting for cost. Because funding is limited, lower-cost solutions are more likely to be implemented.





OR 126/DEERHORN ROAD (MP 11.32)

SAFETY RISKS

Community feedback indicates intersection visibility concerns at this location. Even though the highway is straight, the intersection is small in scale and approaching drivers may not expect stopped or slowing vehicles. There is an increased risk of eastbound rear ends at this location due to the sharp right turn for the intersection and nearby shoulder pull-off area. There is also a risk of high-severity roadway departure crashes due to steep slopes and deep ditches on both shoulders.

SOLUTIONS

- » *Install systemic stop-controlled intersection visibility upgrades*
- » *Increase sight triangle by removing vegetation*
- » *Upgrade to high-visibility striping*
- » *Install/upgrade signs with high visibility sheeting*
- » *Install retroreflective tape on sign posts at non-intersection locations*
- » *Install delineation on centerlines and edgelines*
- » Modify drainage areas to create flatter slopes on road shoulders
- » Install eastbound right turn lane
- » Install single lane roundabout

FIGURE 3. OR 126 EAST AT DEERHORN ROAD, LOOKING WEST



Source: Google Maps Street View



WALTERVILLE CANAL BRIDGE SEGMENT (MP 12.90-13.15)

SAFETY RISKS

There is an increased risk of fixed object and head-on crashes due to the narrow bridge over the Walterville Canal. The narrow bridge width also does not provide space for drivers to avoid a crash or recover after making an error. There are also driveways and intersections close to the bridge that contribute to a higher risk of rear-end crashes.

CRASH HISTORY:

This location has fatal and serious injury crash history.

SOLUTIONS

- » *Install wider edge lines and upgrade to high-visibility striping*
- » *Install/upgrade signs with high visibility sheeting*
- » *Install “Narrow Bridge” warning signs*
- » *Install retroreflective tape on sign posts at non-intersection locations*
- » *Install delineation on centerlines and edgelines*
- » Install centerline rumble strips
- » Widen shoulders and install profiled edgeline markings

FIGURE 4. AERIAL VIEW OF THE WALTERVILLE CANAL BRIDGE





OR 126/ROSS LANE (MP 15.61)

SAFETY RISKS

This intersection is small in scale and is located within a horizontal curve, which limits visibility for approaching drivers. Drivers may not expect stopped or slowed vehicles, resulting in an increased risk of turning and rear-end crashes.

CRASH HISTORY:

This location has serious injury crash history and was a 2021 ODOT SPIS site.

SOLUTIONS

- » *Install systemic stop-controlled intersection visibility upgrades*
- » *Increase sight triangle by removing vegetation*
- » *Install delineators at driveways and intersections*
- » *Upgrade to high-visibility striping*
- » *Install/upgrade signs with high visibility sheeting*
- » *Install retroreflective tape on sign posts at non-intersection locations*
- » *Install delineation on centerlines and edgelines*
- » Remove or relocate fixed objects such as utility poles outside of clear recovery zone

FIGURE 5. OR 126 EAST AT ROSS LANE, LOOKING WEST



Source: Google Maps Street View



OR 126/HOLDEN CREEK LANE, WEST ENTRANCE (MP 17.66)

SAFETY RISKS

Community feedback indicates intersection visibility concerns at this location. Even though the highway is straight, the intersection is small in scale and approaching drivers may not expect stopped or slowing vehicles. There is an increased risk of eastbound rear ends at this location due to the sharp right turn for the intersection and nearby shoulder pull-off area. There is also a risk of high-severity roadway departure crashes due to steep slopes and deep ditches on both shoulders.

SOLUTIONS

- » *Install systemic stop-controlled intersection visibility upgrades*
- » *Increase sight triangle by removing vegetation*
- » *Upgrade to high-visibility striping*
- » *Install/upgrade signs with high visibility sheeting*
- » *Install retroreflective tape on sign posts at non-intersection locations*
- » *Install delineation on centerlines and edgelines*
- » Modify drainage areas to create flatter slopes on road shoulders
- » Install eastbound right turn lane

FIGURE 6. OR 126 EAST AT HOLDEN CREEK LANE (WEST), LOOKING EAST



Source: Google Maps Street View



OR 126/HOLDEN CREEK LANE, EAST ENTRANCE (MP 19.02)

SAFETY RISKS

Community feedback indicates intersection visibility concerns at this location. Even though the highway is straight, the intersection is small in scale and not well marked, so approaching drivers may not expect stopped or slowing vehicles. There is also a transit stop at this intersection, which is located in a short pull-out area that is frequently used by eastbound drivers making a right-turn.

CRASH HISTORY:

This location has fatal injury crash history.

SOLUTIONS

- » *Install systemic stop-controlled intersection visibility upgrades*
- » *Upgrade to high-visibility striping*
- » *Install/upgrade signs with high visibility sheeting*
- » *Install retroreflective tape on sign posts at non-intersection locations*
- » *Install delineation on centerlines and edgelines*
- » Install intersection lighting

FIGURE 7. OR 126 EAST AT HOLDEN CREEK LANE (EAST), LOOKING EAST



Source: Google Maps Street View



LEABURG DAM SPILLWAY SEGMENT (MP 19.15-19.40)

SAFETY RISKS

The spillway on the north side of the highway and steep grade on the south side of the highway narrow the roadside, which creates an increased risk of fixed-object crashes. The spillway is also adjacent to a horizontal curve, and community members report high speeds on this segment.

SOLUTIONS

- » *Install wider edge lines and upgrade to high-visibility striping*
- » *Install post mounted or guardrail-mounted delineators where the shoulder and/or clear zone are particularly narrow*
- » *Install/upgrade signs with high visibility sheeting*
- » *Install retroreflective tape on sign posts at non-intersection locations*
- » *Install delineation on centerlines and edgelines*
- » Install Safety Edge on shoulders
- » Install centerline rumble strips
- » Install recommended chevron curve signs
- » Install flashing beacons on warning signs
- » Widen shoulders and install edge line rumble strips

FIGURE 8. OR 126 EAST AT LEABURG DAM SPILLWAY, LOOKING WEST



Source: Google Maps Street View



OR 126/JOHNSON CREEK ROAD (MP 19.97)

SAFETY RISKS

This intersection is directly across from the Leaburg Store and gas station and there are several driveways and transit stops nearby, which creates a more complicated driving environment and increases the risk of crashes.

CRASH HISTORY:

This location has serious injury crash history.

SOLUTIONS

- » *Install systemic stop-controlled intersection visibility upgrades*
- » *Upgrade to high-visibility striping*
- » *Install/upgrade signs with high visibility sheeting*
- » *Install retroreflective tape on sign posts at non-intersection locations*
- » *Install delineation on centerlines and edgelines*
- » *Install intersection lighting*

FIGURE 9. OR 126 EAST AT JOHNSON CREEK ROAD



Source: Google Maps Street View



OR 126/GOODPASTURE ROAD (MP 25.63)

SAFETY RISKS

This intersection is located within a horizontal curve, just beyond an increase in posted speed for the westbound direction. There is a one-lane covered bridge on Goodpasture Road that restricts visibility of oncoming vehicles on OR 126 East and Goodpasture Road. Because the bridge is one-lane, drivers on OR 126 have to stop and confirm there are no vehicles in the bridge before turning onto Goodpasture Road. Community members shared concerns about speeding and risky passing maneuvers in this segment.

SOLUTIONS

- » *Install actuated flashing beacons triggered by approaching vehicles*
- » *Install systemic stop-controlled intersection visibility upgrades*
- » *Upgrade to high-visibility striping*
- » *Install/upgrade signs with high visibility sheeting*
- » *Install retroreflective tape on sign posts at non-intersection locations*
- » *Install delineation on centerlines and edgelines*

FIGURE 10. OR 126 EAST AT GOODPASTURE ROAD



Source: Google Maps Street View



BEN AND KAY DORRIS COUNTY PARK SEGMENT (MP 29.15-30.05)

SAFETY RISKS

This location has an increased risk of high-severity road departure crashes due to horizontal curves, steep slopes and narrow shoulders. The Holiday Farm Fire drastically changed the roadside and burned many of the trees that used to provide physical and visual barriers along the highway. Community members note feeling particularly unsafe and uncomfortable driving in this area.

CRASH HISTORY:

There is a periodic ODOT SPIS site along this segment.

SOLUTIONS

- » *Install wider edge lines and upgrade to high-visibility striping*
- » *Install warning signs at Ben and Kay Dorris Park access*
- » *Install/upgrade signs with high visibility sheeting*
- » *Install retroreflective tape on sign posts at non-intersection locations*
- » *Install delineation on centerlines and edgelines*
- » *Install recommended chevron curve signs*
- » Install guardrail
- » Widen shoulders and install edge line rumble strips
- » Install Safety Edge on shoulders
- » Flatten side slopes
- » Install flashing beacons on warning signs

FIGURE 11. AERIAL VIEW OF THE SEGMENT OF OR 126 EAST NEAR BEN AND KAY DORRIS COUNTY PARK



SUMMARY OF CORRIDOR-WIDE COUNTERMEASURES

This section describes the countermeasures that can be applied at many locations within the study area to improve safety.

TABLE 2. OR 126 RECOMMENDED CORRIDOR-WIDE SOLUTIONS, ORGANIZED BY TREATMENT TYPE

TREATMENT	DESCRIPTION	LOCATIONS	ODOT-APPROVED CRF ^A	FHWA PROVEN SAFETY COUNTER-MEASURE	COST ^B	TIME TO IMPLEMENT
INSTALL WIDER EDGE LINES	Install six-inch wide edge lines (fog lines) where paved road shoulder width exceeds 1 foot. ^C	Entire corridor	●	●	Low	0-5 years
INSTALL EDGE LINE RUMBLE STRIPS	Install edge line rumble strips on white edgeline to alert drivers when they are departing the side of the roadway. ^C	Entire corridor	●	●	Low	5-15 years
INSTALL CENTER RUMBLE STRIPS	Install centerline rumble strips to alert drivers when they are entering the opposing traffic lane.	Entire corridor	●	●	Low	5-15 years
INSTALL SAFETY EDGE ON SHOULDERS	Install tapered (beveled) edge treatment on existing shoulders (at edge of pavement) to improve recoverability for drivers that leave the paved roadway. ^C	Entire corridor	●	●	Medium	5-15 years
INSTALL SHOULDER RUMBLE STRIPS	Install shoulder rumble strips to alert drivers when they are departing the side of the roadway. ^C	Entire corridor	●	●	Medium	5-15 years
FLATTEN SIDE SLOPES	Flatten side slopes of roadside to improve recoverability for drivers that leave the paved roadway. ^C	Entire corridor	●	●	High	15+ years
INSTALL FLASHING BEACONS ON WARNING SIGNS	Install solar powered LED flashing beacons or border lights on warning signs at key locations.	Speed reduction zones, intersection warning signs, warning signs for curves with advisory speeds	●		Low	0-5 years
INSTALL SPEED FEEDBACK SIGNS	Install solar powered radar speed feedback warning signs at locations with a history of speed-related crashes or in locations with reduced posted speeds.	Approaches to small communities and sections with reduced posted speed	●		Low	0-5 years

TREATMENT	DESCRIPTION	LOCATIONS	ODOT-APPROVED CRF ^A	FHWA PROVEN SAFETY COUNTER-MEASURE	COST ^B	TIME TO IMPLEMENT
REMOVE OR RELOCATE FIXED OBJECTS OUTSIDE OF CLEAR RECOVERY ZONE	Remove or relocate roadside objects (including trees and utility poles) and grade embankments to maximize clear zone width, within ROW. Maintain vegetation (horizontally and vertically) within ROW or 15' from travel way.	Emphasis on trees and utility poles adjacent to horizontal curves	●		Medium	5-15 years
INSTALL GUARDRAIL	Where hazards within the clear recovery zone cannot be removed or otherwise mitigated, install MASH-compliant guardrails and end treatments.	Ben and Kay Dorris Park; Locations where removing or mitigating a roadside hazard is not feasible	●		High	5-15 years
WIDEN SHOULDERS	Widen paved and gravel shoulders. The ideal shoulder width is 4-8 feet. Consider applying a slurry seal to existing gravel shoulders as an interim or supplemental treatment to minimize deterioration.	Entire corridor	●		High	15+ years
INSTALL DELINEATORS AT DRIVEWAYS AND INTERSECTIONS	Install post mounted delineators at driveways and intersections to help make accesses more visible to drivers.	Entire corridor			Low	0-5 years
DEFINE ACCESS POINTS	Increase visibility of public access points using curbs, striping, signage, and defined parking areas.	Entire corridor			Low	0-5 years
INSTALL WARNING SIGNS AT ACCESS LOCATIONS	Increase visibility of public access locations using warning signs, destination signs, milepost signs, and street name signs.	Entire corridor			Low	0-5 years
ENSURE PROPER SIGNAGE AND PAVEMENT MARKINGS FOR PASSING LANES	Ensure that proper signs and pavement markings are installed and in good condition to increase awareness of passing lanes.	All passing lanes			Low	0-5 years
UPGRADE STRIPING	Upgrade all striping to high-visibility (fluorescent) striping to improve visibility.	Entire corridor			Low	0-5 years

TREATMENT	DESCRIPTION	LOCATIONS	ODOT-APPROVED CRF ^A	FHWA PROVEN SAFETY COUNTER-MEASURE	COST ^B	TIME TO IMPLEMENT
INSTALL/UPGRADE SIGNS WITH HIGH VISIBILITY SHEETING	Upgrade all warning and regulatory signage to current ODOT standards and apply high visibility sheeting, where appropriate.	Entire corridor			Low	0-5 years
INSTALL RETRO-REFLECTIVE TAPE ON SIGN POSTS AT NON-INTERSECTION LOCATIONS	Install retroreflective tape on regulatory and warning sign posts to improve visibility.	Entire corridor			Low	0-5 years
INSTALL "ROAD NARROWS" WARNING SIGNS	Install "Road Narrows" warning signs to alert drivers that the road is narrowing ahead where operating speeds may need to be reduced when two vehicles are traveling in opposite directions.	Entire corridor			Low	0-5 years
INSTALL "NARROW BRIDGE" WARNING SIGNS	Install "Narrow Bridge" warning signs to alert drivers of a bridge having a roadway clearance less than the width of the approach travel lanes.	McKenzie River Bridge (MP 11.4), Waltherville Canal Bridge (MP 13.1)			Low	0-5 years
EVALUATE EXISTING PASSING ZONES	Evaluate existing passing zones to ensure they meet current standards for length and sight distance.	All passing zones			Low	0-5 years
CREATE EDUCATIONAL CAMPAIGN	Develop a media campaign for safe driving with topics including speeding, impaired driving, passing behavior, and winter weather driving	N/A			Low	0-5 years
EVALUATE FUNDING OPPORTUNITIES FOR INCREASED ENFORCEMENT	Evaluate funding opportunities to support more state, county, and local enforcement along the corridor.	N/A			Low	0-5 years
INSTALL DELINEATION ON CENTERLINES AND EDGELINES	Install raised or depressed delineators (pavement markers) to improve visibility of lane lines during dark conditions and inclement weather.	Entire corridor			Low	5-15 years
INSTALL INTERSECTION WARNING SYSTEM	Install intersection warning system with flashing beacons to alert drivers of upcoming stopped vehicles or cross traffic.	All intersections with a high volume of turning traffic and sight distance restrictions			Medium	0-5 years

TREATMENT	DESCRIPTION	LOCATIONS	ODOT-APPROVED CRF ^A	FHWA PROVEN SAFETY COUNTER-MEASURE	COST ^B	TIME TO IMPLEMENT
INCREASE SIGHT TRIANGLE AT INTERSECTIONS	Increase sight triangle at intersections by trimming vegetation, removing trees or fences, or redesigning intersections to improve sight distance for drivers.	Deerhorn Road, Ross Lane, Holden Creek Lane (both entrances), Goodpasture Road			Medium	5-15 years
MODIFY DRAINAGE AREAS	Modify drainage areas to minimize hazards created by culverts, rocks, and ditches, particularly at intersections, on the inside of curves, and at locations with reported ditch-related crashes. ^C	Holden Creek Lane (west)			Medium	15+ years
EVALUATE EXISTING PASSING LANES	Evaluate existing passing lanes to determine whether they meet current standards with respect to passing lanes, taper lengths, and other conditions, with a focus on preventing driveway conflicts and meeting minimum sight distances.	All passing lanes			High	15+ years
MODIFY EXISTING PASSING LANES	Modify existing passing lanes or remove passing lanes to reduce the risk of driveway conflicts and ensure compliance with current standards.	Vida passing lane			High	15+ years

^A CRF = Crash Reduction Factor

^B Cost: Low (<\$250K), Medium (\$250K-\$1M), High (>\$1M)

^C Denotes treatment that would likely require shoulder widening, impacting the estimated implementation cost and timeline.

CONCEPT DESIGNS

Residents of the area expressed a high level of concern about the intersection at Deerhorn Road and the section of highway near Ben & Kay Dorris County Park. Refer to Section 4, Table 2.

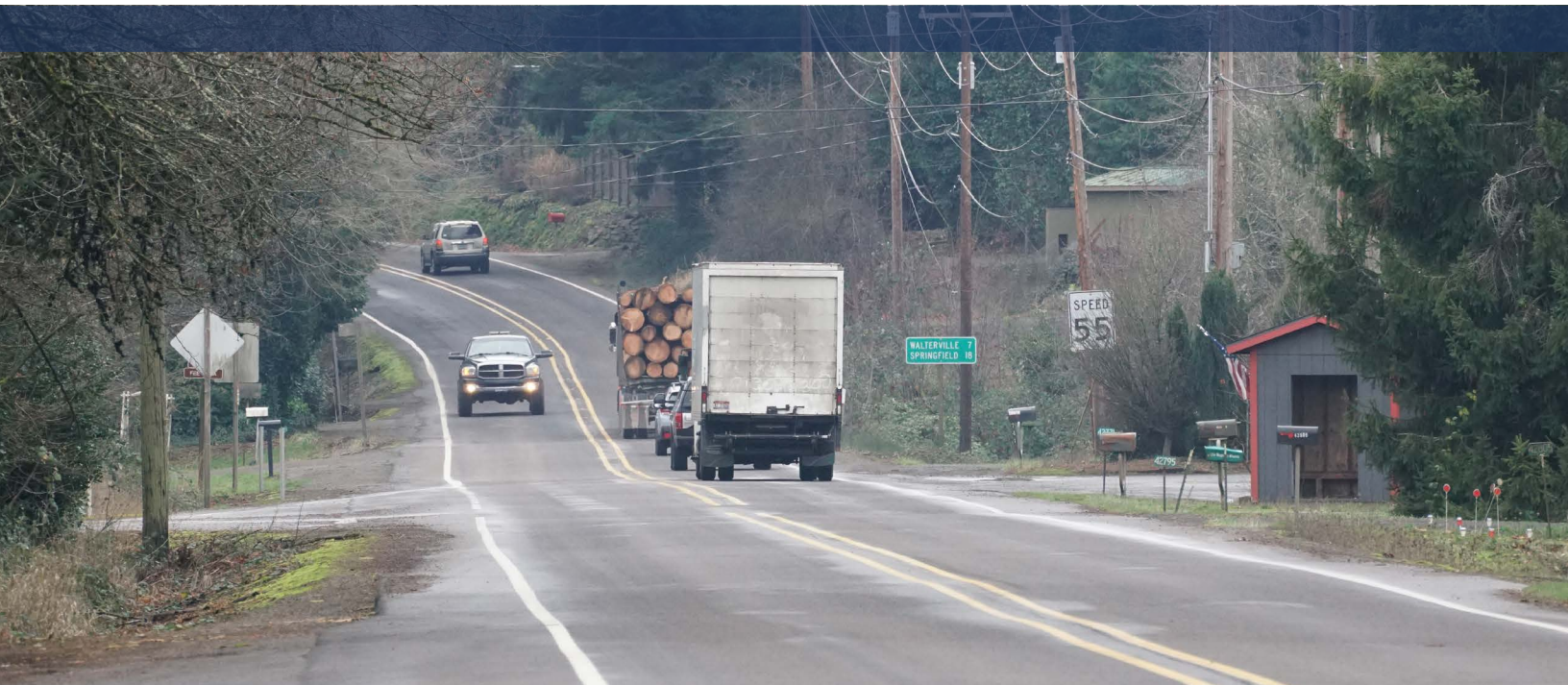
As described earlier in Chapter 5, several safety countermeasures could be employed at the Deerhorn Road intersection. Installing a left-turn lane or a roundabout are identified as options, but they are not considered feasible in the next five years because of the cost. Similarly, installing guardrail near Ben & Kay Dorris County Park is identified as a solution, but the estimated cost makes it infeasible to complete in the next five years.

Because there is a high level of public interest in these two safety focus areas, the project team provided a more in-depth assessment of the following three solutions.

- 1 Left turn lane at Deerhorn Road & OR 126 East**
- 2 Roundabout at Deerhorn Road & OR 126 East**
- 3 Guardrail and curve warning signs along the Ben and Kay Dorris County Park segment**

Planning-level concept designs and cost estimates have been developed for each of three options. The designs shown in the figures below are conceptual only. The dimensions and estimated costs are based on similar projects ODOT has constructed at other locations. The design concepts do not account for all the constraints that exist at these specific locations along OR 126 East.

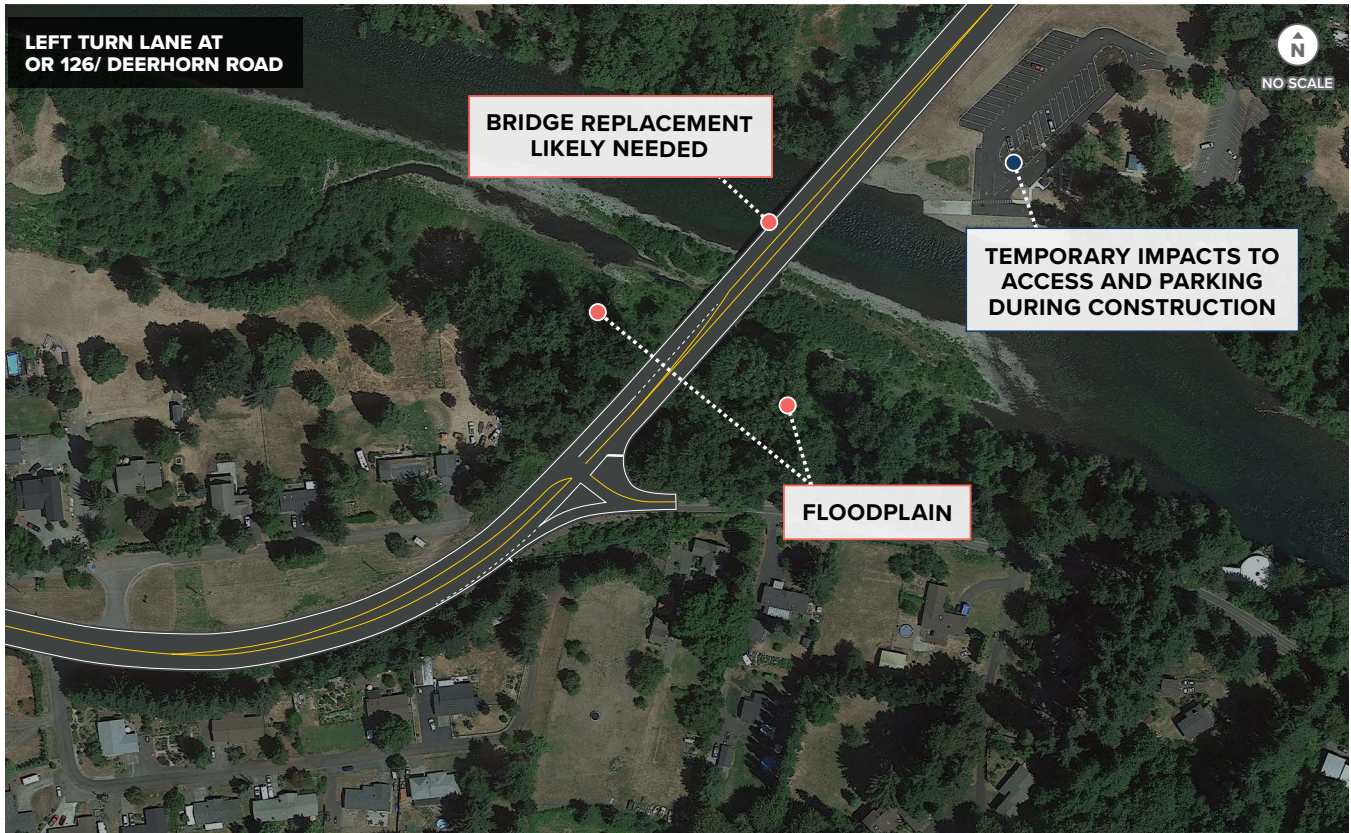
If ODOT is able to identify funding for these projects, additional analysis and design refinement would be required before moving forward to construction.



LEFT-TURN LANE AT DEERHORN ROAD

Building a left-turn lane would require widening or replacing the bridge to meet ODOT design standards. This project could impact the nearby wetland and floodplain areas. It could also, at least temporarily, impact the parking lot and access to Hendricks Bridge County Park during construction.

FIGURE 12. LEFT-TURN LANE CONCEPT DESIGN

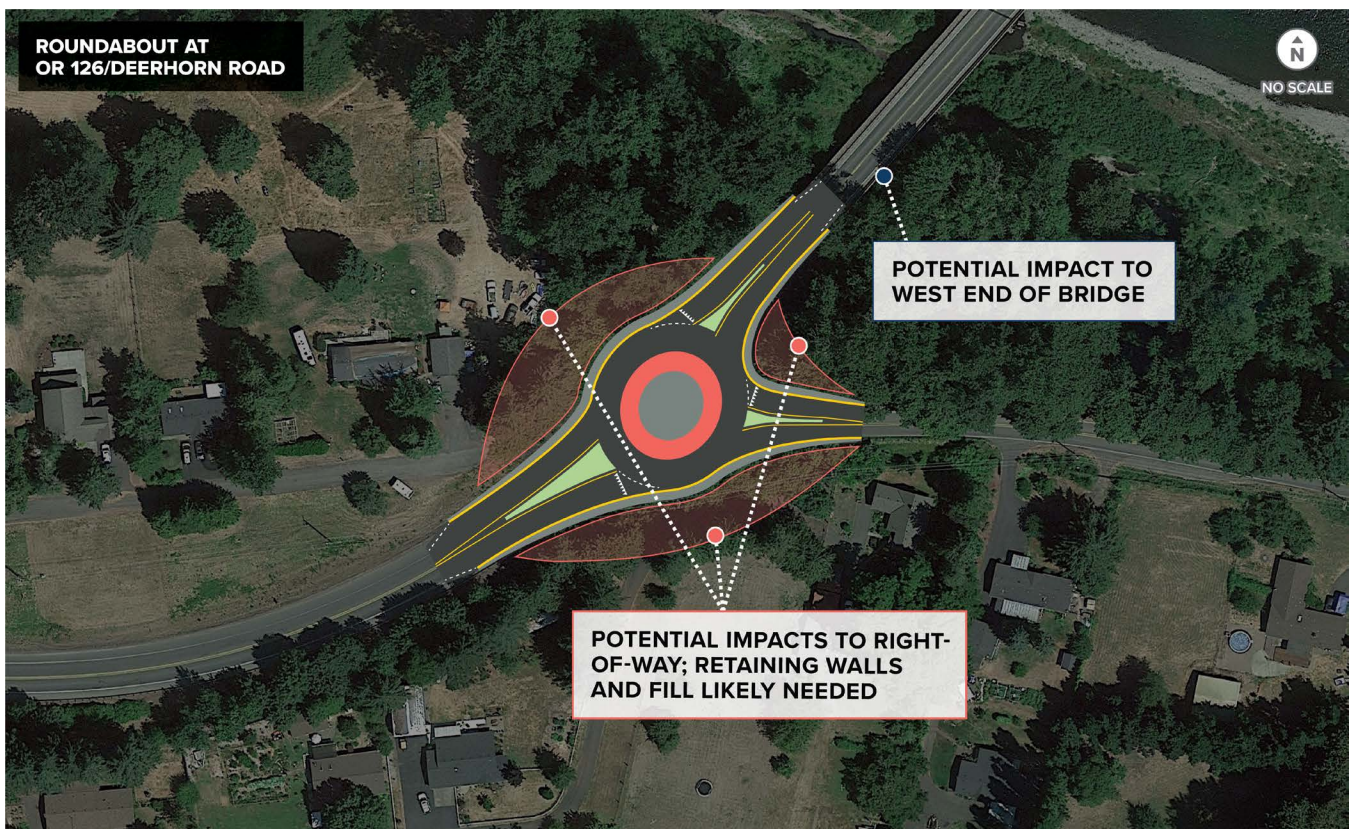


Estimated cost: \$18-20 million

ROUNDAABOUT AT DEERHORN ROAD

Installing a single-lane roundabout is likely to impact adjacent properties. A roundabout would require additional right-of-way. It could also require retaining walls and fill due to the terrain. The west end of the bridge would need to be modified, but full widening or replacement of the bridge can likely be avoided. The concept design shown would meet minimum ODOT design standards. Additional design refinement would be required to incorporate a chicane (curve) or other design element that would slow approaching vehicles to the desired speed.

FIGURE 13. ROUNDAABOUT CONCEPT DESIGN

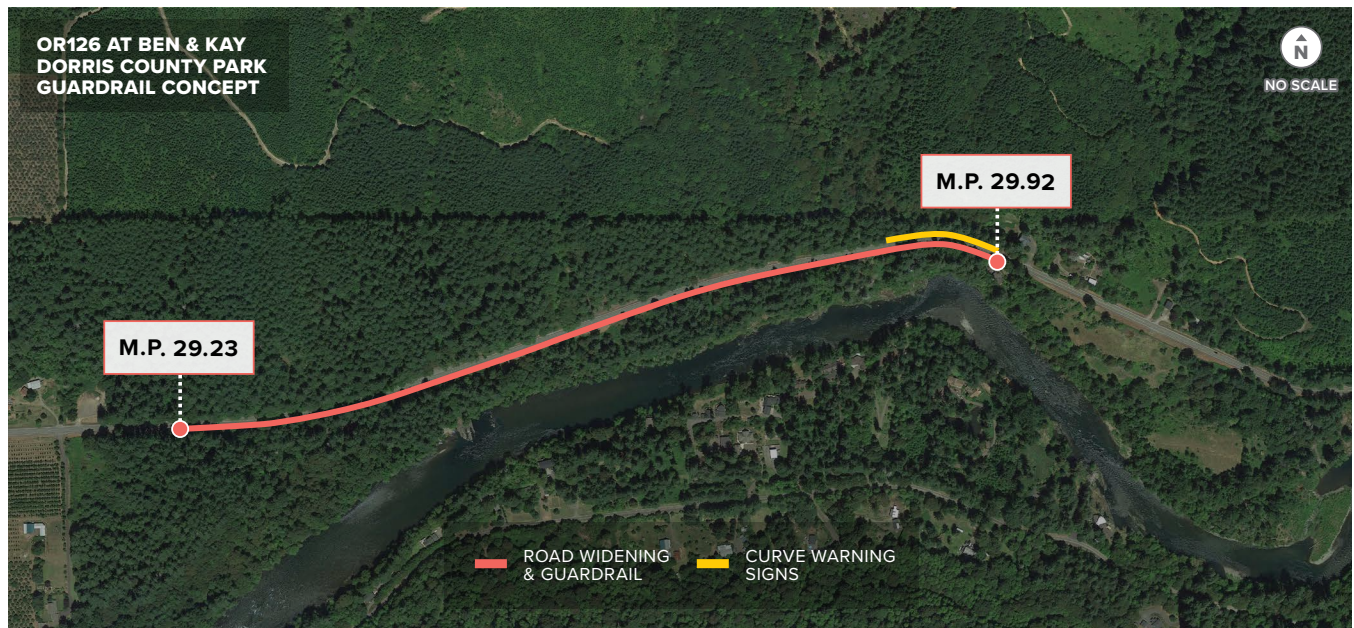


Estimated cost: \$7-10 million

GUARDRAIL NEAR BEN AND KAY DORRIS COUNTY PARK

This solution includes the installation of guardrail on the south side of OR 126 East, which require the shoulder to be widened to meet ODOT design standards. Additionally, upgraded curve warning signs would be installed along the curve on the east end of the guardrail section.

FIGURE 14. GUARDRAIL CONCEPT DESIGN



Estimated cost: \$3-4 million

6.0 » OTHER CONSIDERATIONS & NEXT STEPS



CREATING A SAFER HIGHWAY IS A COMPLEX AND INTENSIVE EFFORT. EVERY PERSON WHO TRAVELS ON OR 126 EAST HAS A RESPONSIBILITY FOR THE SAFETY OF THEMSELVES AND OTHERS. TO TACKLE THE SAFETY ISSUES ON THIS CORRIDOR, COLLABORATION AMONG AGENCIES, ORGANIZATIONS, AND COMMUNITIES IS ENCOURAGED AND MUST TAKE PLACE IN DIFFERENT WAYS.

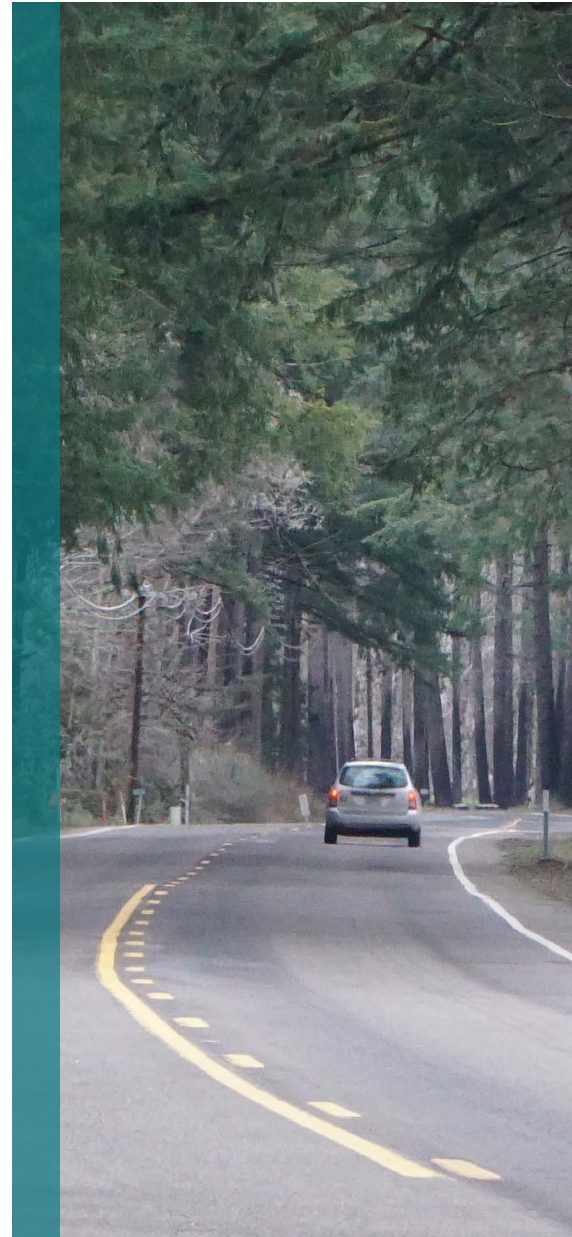
TITLE VI AND ENVIRONMENTAL JUSTICE CONSIDERATIONS

There is a relationship between the demographic characteristics of the residents within a study area and how the transportation system is used. Demographic characteristics include age, ability, income, language, race and ethnicity.

Historically, disadvantaged populations have more mobility challenges, either because they can't afford a car, are unable to drive, or don't have access to convenient public transportation (bus service in this corridor).

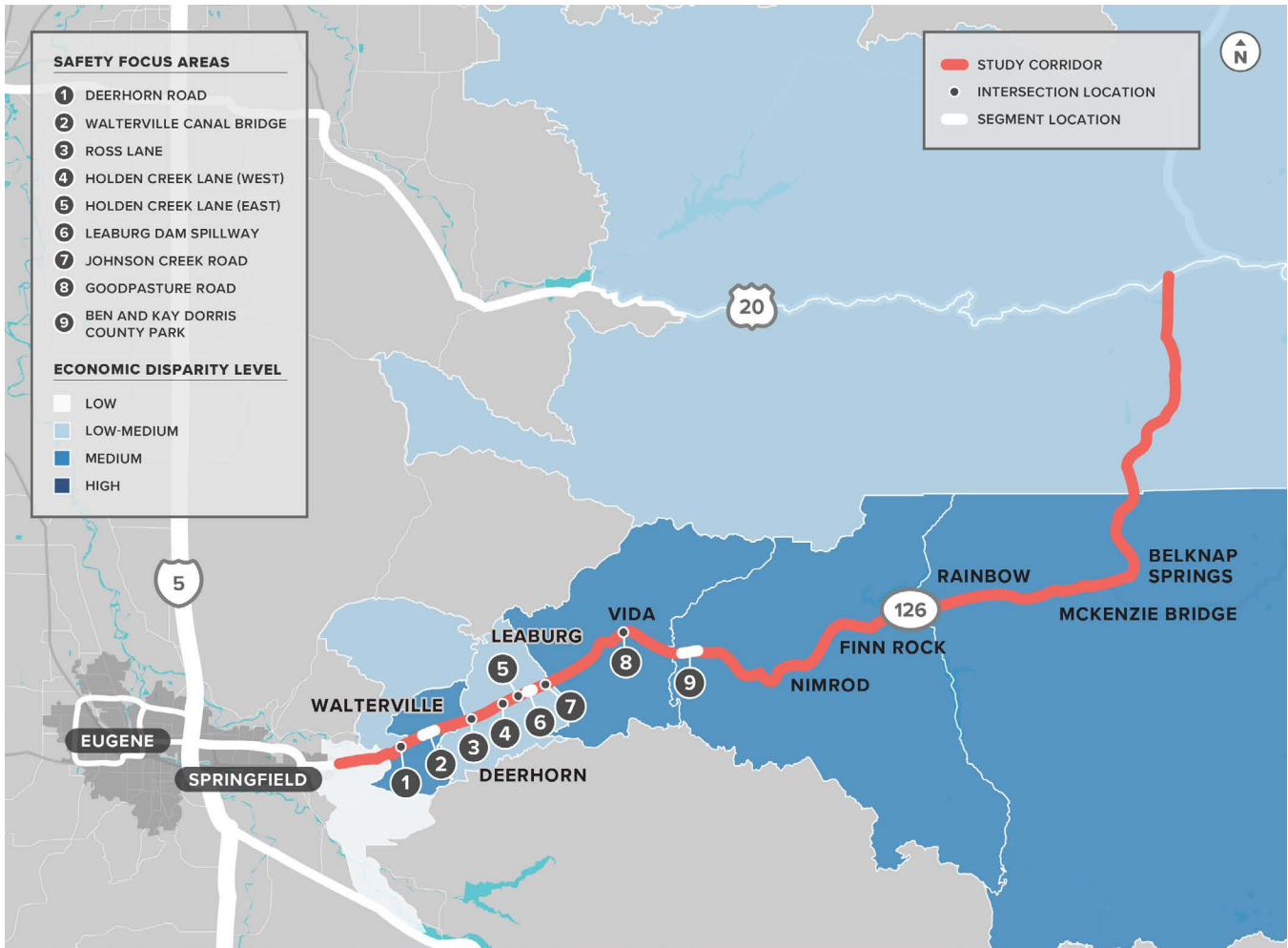
Federal and state transportation policies encourage investment in facilities and services to help disadvantaged populations overcome these barriers. The Oregon Social Equity web map uses data from the American Community Survey to identify areas with concentrations of disadvantaged populations to help target investment for this purpose.¹

Social equity areas are categorized as low, low-medium, medium, or high in terms of economic disparity. Areas with higher economic disparity have a higher percentage of disadvantaged populations. The Waltherville Canal Bridge segment, Goodpasture Road intersection, and Ben and Kay Dorris County Park segment are within areas of medium economic disparity. There are no areas of high economic disparity along the corridor. While age is just one of many elements factored into the Social Equity Index, it should be noted that the entire study corridor is considered to have an over representation of surrounding aging population. The aging population of residents and drivers should be considered when determining appropriate engineering treatments, conducting education efforts, and prioritizing investments.



¹ Oregon Social Equity Web App, Oregon Department of Transportation.
<https://geo.maps.arcgis.com/apps/View/index.html?appid=bbd3d9861fcd40ffa4085d457e4361a7>

FIGURE 15. OR 126 EAST CORRIDOR SOCIAL EQUITY AREAS



FREIGHT MOBILITY CONSIDERATIONS

Some recommended countermeasures, such as roundabouts, enhanced pedestrian crossings, and lane narrowing, may reduce the width of the roadway. If any of these countermeasures are selected for implementation, they may need to be reviewed by the ODOT Mobility Advisory Committee (MAC) during the planning and design process. If the chosen countermeasures improve freight mobility, a MAC review may not be required, even if it reduces the width of the roadway.

NEXT STEPS

HIGHWAY SAFETY IS COMPLICATED. THERE ARE MANY FACTORS THAT INFLUENCE THE “SAFETY PERFORMANCE” OF A HIGHWAY LIKE OR 126 EAST.

This study has identified various safety countermeasures that could be installed or constructed along the corridor to improve safety. ODOT has not yet identified funding to implement these recommendations. The next step is to identify funding.

The focus of this study is on relatively low-cost, high-benefit solutions that could be implemented within the next five years (by 2029). The higher-cost improvements that are also described in the study will take more time.

Roadway improvements are only one part of the safety equation. An equally important factor (variable) is human behavior. Every person has a shared responsibility for their own safety and the safety of others.

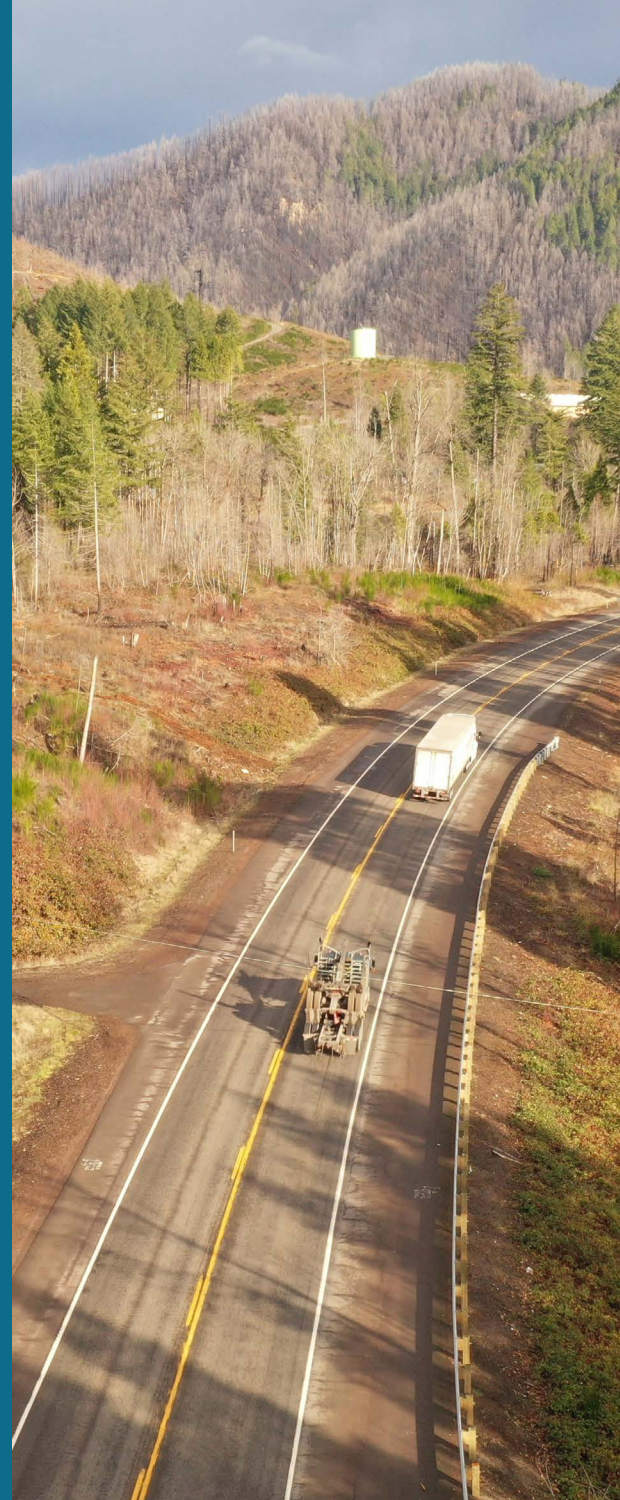
ACTIONS THAT WILL BE REQUIRED TO IMPLEMENT THE RECOMMENDATIONS INCLUDED IN THIS STUDY, AND TO IMPROVE SAFETY ALONG THE CORRIDOR:

- » **ODOT will need to determine which of the recommended improvements are the highest priority. They will then need to identify funding for design and construction.**
- » **Lane County may also be able to contribute funding, especially for those improvements described in the Small Community Toolbox that are not on the state highway.**
- » **The small, unincorporated communities along the corridor may work with Lane County to establish local improvement districts to fund improvements described in the Small Community Toolbox.**
- » **Individuals can make safer choices when driving, walking, and biking. This includes obeying all traffic laws, traveling at safe speeds, and never driving while impaired, drowsy, or distracted.**

OR 126 EAST MCKENZIE HIGHWAY SAFETY STUDY

APPENDIX

JANUARY 2024



APPENDIX CONTENTS

SMALL COMMUNITY TOOLBOX

TECHNICAL MEMORANDUM #1 - BACKGROUND DOCUMENT REVIEW

TECHNICAL MEMORANDUM #2 - EXISTING SAFETY CONDITIONS

TECHNICAL MEMORANDUM #3 - HIGHWAY SAFETY MANUAL PREDICTIVE ANALYSIS

TECHNICAL MEMORANDUM #4 - RECOMMENDED SAFETY COUNTERMEASURES

TECHNICAL MEMORANDUM #5 - CONCEPT DESIGNS AND COST ESTIMATES

TECHNICAL MEMORANDUM #6 - SUMMARY OF FINDINGS