

OR 6 WILSON RIVER HIGHWAY CORRIDOR STUDY (HB 4053)



August 2023

Acknowledgements

We would like to thank the representatives of the following groups who served on advisory committees for this project:

Banks Fire District	Oregon State Legislature
Columbia-Pacific Economic Development District (Col-Pac)	Oregon State Police
City of Banks	Port of Tillamook Bay
City of Bay City	Safety On 6 Community Group
City of Forest Grove	Tillamook Chamber of Commerce
City of Tillamook	Tillamook Coast Visitors Association
Forest Grove Fire & Rescue	Tillamook County
Lewis & Clark Timberlands Office	Tillamook County Sheriff
NW Oregon Transit Alliance (NWOTA)	Tillamook County Creamery Association
Northwest Oregon Area Commission on Transportation	Tillamook Fire District
Oregon Coast Visitors Association	Tillamook Forest Center
Oregon Department of Forestry	Tillamook Police Department
Oregon Department of Transportation	Verizon Wireless
Oregon Parks and Recreation Department	Washington County
	Washington County Sheriff
	Zwald Transport, Inc.

SUPPORTERS

The advisory committees provided input throughout the project and have expressed their support of the final report. These committees acknowledge the importance of resolving the unstable slope issues in the corridor to improve the resiliency of the highway and allow a foundation upon which the other safety improvements can be built. The advisory committees support the work that has been completed and look forward to progressing improvements so that meaningful change can be made in the corridor to improve the lives of the citizens, tourists, and businesses who drive OR 6.

All photos from Oregon Department of Transportation unless otherwise noted.

OR 6 Wilson River Highway Corridor Study (HB 4053)

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Contents

Acknowledgements	2
Executive Summary	6
The Need for a Safer OR 6	6
Solving Safety Problems	7
The Funding Roadblock	8
Why fund projects on OR 6?	8
About the Project.	9
The Safety Study	9
Public Engagement	10
SAC Priorities	11
Funding Context and Overview	12
Funding for Study Recommendations	12
Maintenance Funding	14
Recommendations and Considerations	16
Package A: Systemic Signage	18
Package B: Corridor Pavement Markings	20
Package C: Rumble Strips.	22
Package D: Intelligent Transportation System and Communications	24
Package E: Passing Opportunities Capital Projects	26
Project E1: Longer Passing Opportunities	27
Project E2: Full Climbing Lanes Over the Summit	29
Package F: Unstable Slopes Remediation	31
Package G: Other Large Capital Projects	32
Project G1: Pavement Rehabilitation Project	32
Project G2: Wilson River Loop Intersection Project	33
Project G3: Gales Creek Intersection Project	35
Project G4: Summit Safety and Paving Project	37
Package H: Strategies to Address Behavioral Components	38
Package I: Policies or Long-Term Studies	39
Package J: Identification of Funding Needs	40
Future Considerations	41

WEST

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Executive Summary

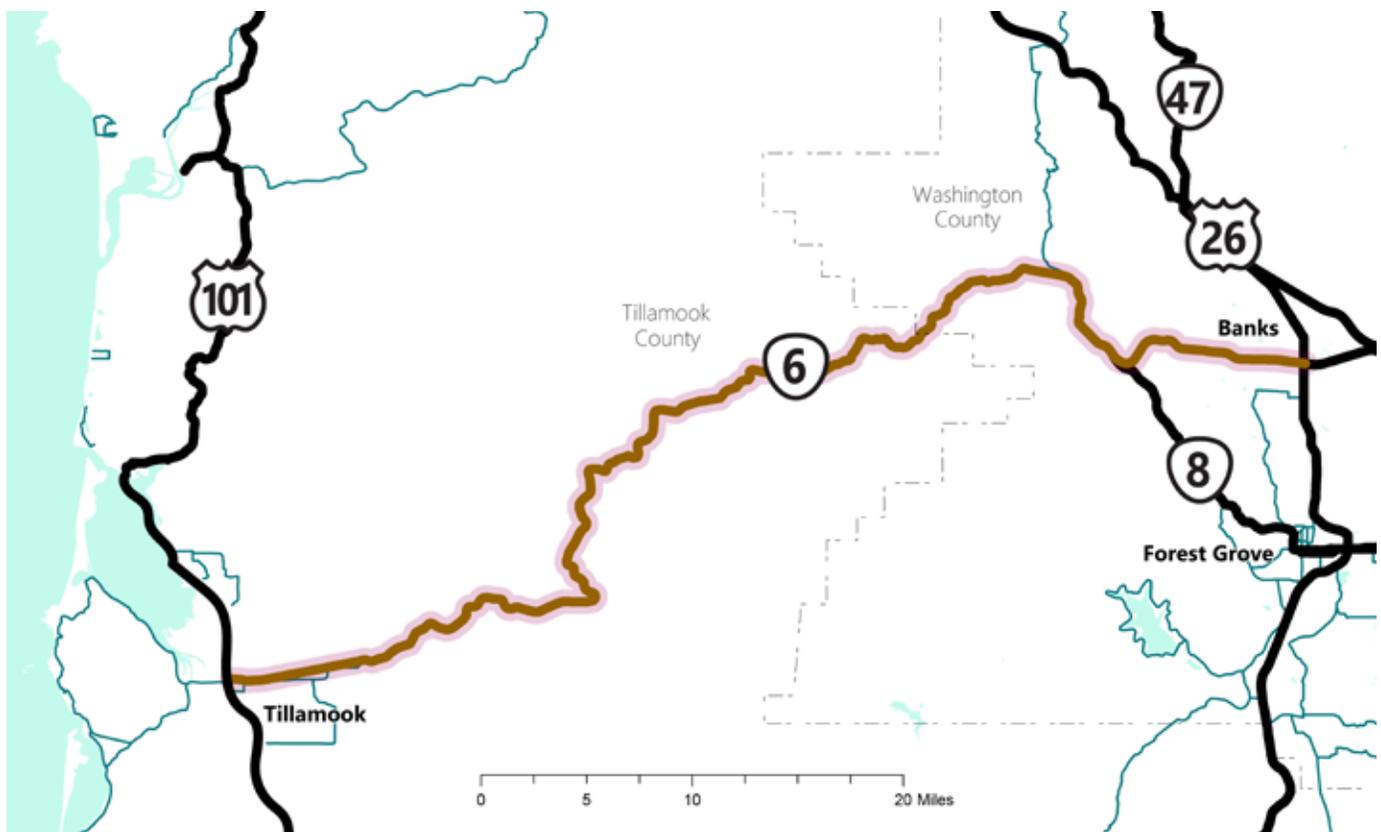
OR 6, also known as the Wilson River Highway, is a 48-mile route that connects Banks and Tillamook. It's a popular route for tourists and an important commercial link between the Portland metro area and the Oregon Coast.

In the past 10 to 15 years, changes in the area's economy have brought more freight, tourist and transit traffic to OR 6. As traffic has increased, crashes and fatalities have become more common.

THE NEED FOR A SAFER OR 6

Area residents and others who drive on OR 6 want this route to be and feel safer. They petitioned the Oregon State Legislature, which passed House Bill 4053 in 2022, requiring Oregon Department of Transportation to prepare this safety study.

The study team gathered public input, reviewed data and developed a list of solutions to OR 6's pressing safety issues. These solutions were organized into project packages. The packages are not prioritized, and some solutions are included in multiple packages. This approach gives decision-makers the flexibility to match packages to available funding requirements.



Map by Kittelson & Associates

SOLVING SAFETY PROBLEMS

The types of solutions grouped within each package have historically been completed at the same time.

Package	Description	Estimated Cost ¹ Range
PACKAGE A: SYSTEMIC SIGNAGE	Install signs throughout the corridor to encourage appropriate speeds, inform roadway users of potential conflicts and delineate curves and destinations.	\$1.8 - \$2.34 million
PACKAGE B: CORRIDOR PAVEMENT MARKINGS	Update all roadway striping. Restripe areas near communities and destinations to reinforce slower speeds. Minimize passing opportunities in these areas and provide a buffered shoulder when possible.	\$7.3 - \$9.49 million
PACKAGE C: RUMBLE STRIPS²	Install rumble strips along the outside of the travel lane to inform drivers if they leave the lane and along the centerline to alert them if they enter the oncoming travel lane.	\$1.2 - \$1.56 million
PACKAGE D: INTELLIGENT TRANSPORTATION SYSTEM (ITS) AND COMMUNICATIONS	Expand ITS and communications devices throughout the corridor, such as a weather warning system; traffic cameras connected to applications such as TripCheck; variable message signs to warn drivers of incidents or conditions ahead; a variable speed guidance system that adjusts speed limits in hazardous weather.	\$2.0 - \$2.6 million
PACKAGE E: PASSING OPPORTUNITIES CAPITAL PROJECTS	These packages include several capital projects to address passing opportunities. Project E1 focuses on eliminating unsafe passing opportunities and constructing new passing opportunities where it is most economical. Project E2 focuses on constructing passing/climbing lanes on both sides of the highway and over the summit.	Project E1: \$35.0 - \$45.5 million Project E2: \$102.8 - \$133.64 million
PACKAGE F: PRIORITIZED UNSTABLE SLOPES REMEDICATION	Address the 18 priority unstable slopes along OR 6 based on ODOT's Geotechnical Report. Fourteen of the 18 priority locations are located between milepost 31 and milepost 35.	\$38.0 - \$49.4 million

¹ Cost estimates are in 2023 dollars and based on current assumptions. They are meant to help decision-makers weigh the relative expense of the different packages. They are not detailed enough to support funding requests.

² A rumble strip project has been funded through design and is intended to be funded through construction.

Package	Description	Estimated Cost¹ Range
PACKAGE G: OTHER LARGE CAPITAL PROJECTS	Project G1: Pavement Rehabilitation Project <ul style="list-style-type: none"> • Poor pavement locations • Fair pavement locations Project G2: Wilson River Loop Intersection Project ² Project G3: Gales Creek Intersection Project Project G4: Summit Safety and Paving Project	G1: <ul style="list-style-type: none"> • \$33.8 - \$43.94 million • \$7.6 - \$9.88 million G2: \$3.9 - \$5.07 million G3: \$0.4 - 0.52 million G4: \$13.3 - \$17.29 million
PACKAGE H: STRATEGIES TO ADDRESS BEHAVIORAL COMPONENTS	Conduct a safe driving media campaign and evaluate funding opportunities for increased enforcement. Consider installing speed feedback signs along more urban areas of the corridor that report driver speed compared to posted speed.	TBD
PACKAGE I: POLICIES OR LONG-TERM STUDIES	Complete policies or long-term studies to address safety issues on OR 6 related to finding and accessing recreational destinations and communities, the lack of passing opportunities and navigating roadway conditions.	TBD
PACKAGE J: IDENTIFICATION OF FUNDING NEEDS	Evaluate funding opportunities and look for occasions to partner with other agencies to increase maintenance and enforcement.	TBD

¹ Cost estimates are in 2023 dollars and based on current assumptions. They are meant to help decision-makers weigh the relative expense of the different packages. They are not detailed enough to support funding requests.

² A modified right turn lane project has been funded through design and is intended to be funded through construction.

THE FUNDING ROADBLOCK

None of the solutions to OR 6’s identified safety issues are funded through construction, and finding money for them will be challenging. Many can be classified as maintenance. Unfortunately, ODOT’s maintenance budget is funded by gas taxes, and the value of this revenue source has declined with rising inflation and the growing popularity of fuel-efficient cars and trucks.

OR 6 must compete with roads across the state for limited funds for capital projects. Any group providing funding for a project on OR 6 should discuss with ODOT before doing so to understand scope and budget.

WHY FUND PROJECTS ON OR 6?

There is no convenient parallel route to OR 6. If a landslide closes the highway, travelers could be forced to go more than 30 miles out of their way. With limited cellphone service, even reporting an incident may require someone to drive out of the area.

Failure to take care of both basic maintenance work and underlying issues, like the unstable, landslide-prone slopes near the summit, will worsen current safety problems, and could introduce new ones.

About the Project

The Wilson River Highway, OR 6, is a 48-mile rural road that connects Banks and Tillamook. It's a popular route for tourists and an important commercial connection between the Oregon Coast and the Portland metro area.

As freight and recreational use of OR 6 has increased, crashes and fatalities have become more common. Area residents and others who drive on OR 6 want this route to be and feel safer.

In response, the Oregon State Legislature passed House Bill 4053 in 2022, requiring Oregon Department of Transportation to do a safety study — this report is the result.

THE SAFETY STUDY

This study was a collaborative effort between ODOT staff, experienced transportation planners and engineers, geotechnical and environmental experts and people who live and work in the communities connected by OR 6. To understand needs along the corridor, the study team:

- ◆ Gathered community feedback on existing problems.
- ◆ Looked at issues related to safety, freight, operations and road conditions.
- ◆ Created a list of potential solutions and projects, including estimated construction costs.

Though this report recommends future legislative funding, it's important to note that the solutions and projects recommended here are not yet funded for design or construction.



PUBLIC ENGAGEMENT

The study team reached out to OR 6 road users to better understand the challenges in the corridor. They connected with the community through a project website, tabling events, in-person and online open houses and advisory committee meetings.

Public feedback helped the study team develop potential solutions and the example implementation packages discussed later in this report. Appendix A includes summaries of the team's public engagement activities.

Public Engagement by the Numbers

The following key issues arose in conversations with the public and the study team's data review.

Corridor-wide issues

- ◆ Roadway users have a hard time finding and accessing recreational destinations and communities.
- ◆ Some motorists drive too fast around curves.
- ◆ Some existing passing opportunities are too short, and motorists want more passing opportunities.
- ◆ There is increased risk of crashes when roadway conditions have rain, snow, or ice.
- ◆ Pavement condition is poor and unstable slopes increase the risk of landslides.
- ◆ Cellphone service is limited, making emergency response challenging.
- ◆ Some drivers take too many risks.

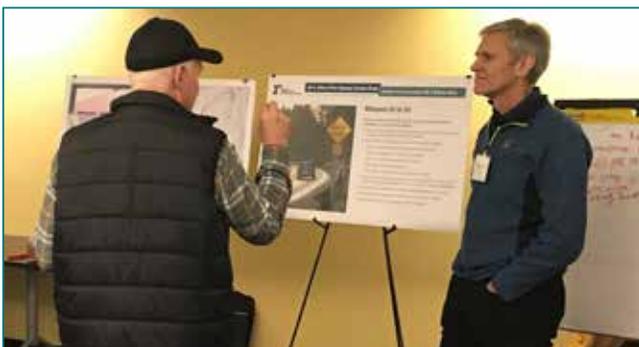


Photo: Kittelson & Associates



Location-specific issues

◆ Wilson River Loop intersection

- There have been more crashes here than usual for this type of intersection. ODOT identified the intersection as a high safety priority in 2019 and 2020. Vehicles in the westbound right-turn lane also restrict sight distance for southbound vehicles waiting to turn.

◆ Gales Creek intersection

- There have been more crashes here than usual for this type of intersection. The intersection also meets volume criteria for a westbound left-turn lane on OR 6.

◆ The corridor summit (approximately milepost 31 to milepost 35)

- This section of OR 6 had the highest concentration of severe crashes in the corridor, particularly between milepost 33 and milepost 34. It has many curves, poor pavement conditions and unstable slopes. There are several short passing lanes at sections with curves. This area has more reported snow- and ice-related crashes.



Photo: Kittelson & Associates

Corridor Crash History 2016 – 2020



Only preliminary 2021 data was available at the time of analysis, which indicated 7 fatal crashes in 2021.

SAC PRIORITIES

The SAC members provided feedback throughout the project. Their priorities for future work in the corridor are documented in Appendix D and summarized below:

1. Unstable Slopes Remediation
2. Strategies to Address Behavioral Components
3. Systemic Signage, Pavement Markings, and Rumble Strips
4. Pavement Rehabilitation at Poor Pavement Locations

Funding Context and Overview

Transportation departments across the United States struggle to fund operating costs, and ODOT is no exception. As inflation erodes the value of the gas tax revenues they depend on, almost every transportation department has begun to experience financial difficulties.

The state and federal government passed several funding packages to support transportation system projects and programs, such as HB 2017 and the Infrastructure Investment and Jobs Act. Unfortunately,

these packages provide little support for routine expenses, such as road maintenance, revenue collection, program management or administrative and overhead costs.

FUNDING FOR STUDY RECOMMENDATIONS

There are a number of potential sources the community could pursue to fund the safety improvements recommended in this report.



State funding sources

- ◆ In Oregon, the State Highway Fund covers both projects and operating costs, including maintenance and operations, revenue collection and shared services.
- ◆ Enhance Highway programs are a smaller slice of the STIP budget and fund projects that enhance or expand and upgrade the state highway system. These projects can include a wide range of investments like new lanes and interchange improvements. Not all projects in this report will qualify for Enhance Highway program funding.

Federal funding sources

- ◆ The Statewide Transportation Improvement Program or STIP, is ODOT's capital improvement plan for state- and federally-funded projects. Most STIP funding is dedicated by state or federal law to projects and cannot be used for agency operational costs.
- ◆ Rural Opportunities to Use Transportation for Economic Success (ROUTES) Initiative: Addresses disparities in rural transportation infrastructure by developing user-friendly tools and information, aggregating USDOT resources into a single web resource and providing technical assistance. This initiative can help rural communities in Oregon access information and resources to improve their transportation infrastructure.
- ◆ The PROTECT Discretionary Grant Program: Funds projects that address the climate crisis by improving the transportation system's resilience. Candidate projects should be grounded in the best available scientific understanding of climate change risks, impacts and vulnerabilities. Innovative and collaborative approaches to risk reduction are encouraged, including the use of natural infrastructure.
- ◆ Federal Lands Access Program: Improves transportation facilities that provide access to, are adjacent to or are located within federal lands. The Access Program supplements state and local resources for public roads, transit systems and other transportation facilities, with an emphasis on high-use recreation sites and economic generators.
- ◆ Building Resilient Infrastructure and Communities (BRIC): Supports hazard mitigation projects, reducing the risks that states, local communities, tribes and territories face from disasters and natural hazards. The BRIC program supports capability and capacity-building, innovation, and partnerships. It enables large projects and those that maintain flexibility and provide consistency.
- ◆ All Roads Transportation Safety Program: Addresses safety needs on all public roads in the state, promoting best practices for infrastructure safety and reducing fatal and serious-injury crashes. Collaboration with local road jurisdictions is key to the program's success. This program is funded through the federal Highway Safety Improvement Program.

MAINTENANCE FUNDING

While ODOT has made several improvements to OR 6 in the past decade, funding availability has not kept up with the highway's deterioration. Meanwhile, the area's economy has drastically changed. Agriculture and manufacturing in Tillamook County have increased with the growth of businesses like Tillamook Creamery, which in turn has increased freight traffic.

The tourism industry has grown, bringing more people to tourist destinations accessed by OR 6. The corridor has also developed into a regional transit route over the last several years.

ODOT's current operations and maintenance budget is facing a wide funding gap in the near future. Gas tax funding, which supports these services, is impacted by both inflation and increased vehicle fuel efficiency.

Most new revenue for ODOT in the past 20 years has gone into construction projects and maintenance costs to preserve a rapidly deteriorating infrastructure system. This increases the need for ongoing maintenance funds. ODOT's operations and maintenance revenues remain flat while the costs continue to rise.

There are several options the State Legislature may consider to address ODOT's operations and maintenance shortfall:

- ◆ Raise additional revenue for operations and maintenance.
- ◆ Index taxes and fees, allowing them to increase to keep pace with inflation.
- ◆ Set a road usage charge for new efficient vehicles.
- ◆ Increase the share of HB 2017 funds going to maintenance.
- ◆ Increase DMV fees.

For locations that need ongoing maintenance, it may be worth considering a larger, one-time project to improve the conditions of the existing infrastructure elements to reduce annual maintenance costs. It's important to remember there is a cost to doing nothing or maintaining status quo. Unstable slopes, for example, are an issue that creates more and more damage over time. Pavement conditions worsen, which impacts roadway markings and decreases driver visibility. Though these locations are restriped annually, the unstable slopes are not addressed, so pavement and striping issues keep occurring. An annual maintenance cost may not make sense in the long term if it becomes clear it will have to be repeated indefinitely.





Recommendations and Considerations

As part of the study, the team developed potential project packages to address the safety issues on OR 6. The packages combine concepts from Technical Memorandum #5 Potential Corridor Solutions, available in Appendix B. This memorandum quantifies safety benefits for specific solutions when enough published research is available to do so. For others, the team included qualitative benefits.

Each package is summarized in the following pages, including rough construction costs. These cost estimates are meant to help decision-makers weigh the relative expense of the different packages. They are not detailed enough to support funding requests. The assumptions the study team made when estimating rough construction costs are shown in Appendix C.

The types of solutions grouped within each package have historically been completed at the same time. These groupings can be revised to meet funding requirements. Some solutions are included in more than one package. If one package that includes a given solution is completed, the scope and cost of the other packages that include it may be reduced.

It's important to note that all estimates are in 2023 dollars and do not account for inflation or future market changes. Construction costs continue to escalate every year and project budgets should be continuously reviewed to match market conditions. Many of the roadway condition issues seen on OR 6 stem from the unstable slopes, especially in the summit area (milepost 31 to milepost 35). Unstable slopes will need to be addressed before spending time and money to implement other projects that do not address the root cause of many of the issues along the corridor.



OR 6 Wilson River Highway Corridor Study (HB 4053)

Summary table of the packages and projects outlined in the coming pages.

Package	Description	Cost Range	Notes
PACKAGE A: SYSTEMIC SIGNAGE	Install signs along corridor to encourage appropriate speeds, inform users of potential conflicts and delineate curves and destinations. Recommended signs are part of a safety-focused systemic sign project.	\$1,800,000 - \$2,340,000	Coordination recommended for future cost estimating.
PACKAGE B: CORRIDOR PAVEMENT MARKINGS	Install recessed pavement markers and update and maintain highly retroreflective roadway striping to ensure visibility. Update pavement markings to meet all current standards.	\$7,300,000 - \$9,490,000	Coordination recommended for future cost estimating.
PACKAGE C: RUMBLE STRIPS	Install centerline and edgeline rumble strips	\$1,200,000 - \$1,560,000	Coordinate cost with ODOT.
PACKAGE D: INTELLIGENT TRANSPORTATION SYSTEM AND COMMUNICATIONS	Expand ITS and communications devices throughout the corridor, contingent on fiber installation and utility companies.	\$2,000,000 - \$2,600,000	Fiber optic cable needs to be installed prior to project.
Package E:	Passing Opportunities Capital Projects		
PROJECT E1: LONGER PASSING OPPORTUNITIES	Focuses on evaluating short passing opportunities and constructing longer ones where most economical. Note: Unstable slopes would need to be fixed first.	\$35,000,000 - \$45,500,000	Coordinate future cost with ODOT.
PROJECT E2: FULL CLIMBING LANES OVER THE SUMMIT	This would connect and extends existing passing/climbing lanes over the summit, see page 30. This allows the eastbound passing/climbing lanes to end on the straight segment of OR 6 from milepost 30.88 to milepost 33.32. The westbound passing/climbing lane will be extended past the summit and go from milepost 32.27 to milepost 35.70.	\$102,800,000 - \$133,640,000	Coordination recommended for future cost estimating. Unstable slopes need to be fixed first.
PACKAGE F: UNSTABLE SLOPES REMEDIATION	Address 18 priority unstable slopes along OR 6 based on Geotechnical Report. Fourteen of the priority locations are between milepost 31 and milepost 35.	\$38,000,000 - \$49,400,000	Coordinate future cost with ODOT.
Package G:	Other Large Capital Projects		
PROJECT G1: PAVEMENT REHAB	Improve pavement segments in poor or fair condition.	Varies based on condition.	Coordinate cost with ODOT.
PROJECT G2: WILSON RIVER LOOP INTERSECTION	The near-term option for this intersection includes a 12-foot buffer between the westbound through travel lane and the right-turn lane, see page 34.	\$3,900,000 - \$5,070,000	Coordinate future cost with ODOT.
PROJECT G3: GALES CREEK INTERSECTION	Install delineators, intersection warning signs, striping, and an actuated intersection warning system to alert drivers if vehicles are stopped in the travel lane to turn left onto Gales Creek Road, see page 36.	\$400,000 - \$520,000	Coordinate future cost with ODOT.
PROJECT G4: SUMMIT SAFETY AND PAVING PROJECT	Full pavement reconstruction, install delineators, a weather warning system, and recessed pavement markers from approximately milepost 31 to milepost 35. Look at package E and F for items to include in this broader summit project.	\$13,300,000 - \$17,290,000	Coordinate future cost with ODOT.

Summary table of the packages and projects outlined in the coming pages continued.

Package	Description	Cost Range	Notes
PACKAGE H: STRATEGIES TO ADDRESS BEHAVIORAL COMPONENTS	Conduct a safe driving campaign and look for funding opportunities to increase enforcement efforts in the corridor.	Cost varies based on the amount of staff time needed.	ODOT and law enforcement would need to coordinate effort.
PACKAGE I: POLICIES OR LONG-TERM STUDIES	Complete policies or long-term studies that address safety issues related to finding and accessing recreational destinations, the lack of passing opportunities and navigating roadway conditions.	Cost varies based on the amount of staff time needed.	ODOT and local agencies would need to coordinate effort.
PACKAGE J: IDENTIFICATION OF FUNDING NEEDS	Evaluate funding opportunities and look for ways to partner with other agencies to increase maintenance and enforcement.	Varies based on amount of funds acquired.	ODOT would coordinate effort with local agencies.

PACKAGE A: SYSTEMIC SIGNAGE

Description

Install signs throughout the corridor to encourage appropriate speeds, inform roadway users of potential conflicts and delineate curves and destinations. Types of signs that are recommended are part of a safety-focused systemic sign project.

Types of signs include:

- ◆ Updating reflective signs where they are missing or old.
- ◆ Installing/updating appropriate warning signage, advanced street name signage and intersection signage as needed. Warning signs may include those for intersections, pedestrians, rough pavement, wildlife and narrow bridge.
- ◆ Adding destination signage for recreational areas or trailheads.
- ◆ Adding delineators to define driveways, intersections and/or curves.
- ◆ Verifying consistent curve signage and updating/installing signs as needed.
- ◆ Adding signs for chain-up areas and updating snow zone signs.
- ◆ Adding community signage at both ends of key communities as able (Glenwood area, Lee’s Camp area and Jordan Creek area).

Safety issues addressed

- Finding and accessing recreational destinations and communities
- Curves
- Safer passing opportunities
- Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- Communications
- Risky driving behaviors

General benefits

- ◆ Increased visibility and driver awareness of roadway conditions and context.
- ◆ Increased driver awareness/lower potential for vehicle interactions.
- ◆ Quantitative benefits detailed in Technical Memorandum #5 (Appendix B).

Implementation considerations

Signage can be installed at any time. Other projects do not have to occur first. If widening or other work outside the paved roadway is planned soon in a signage location, combining the two efforts or waiting to install the sign until the other work is done will limit redundancy.

Maintenance considerations

Adding signs and delineators to OR 6 will increase maintenance needs. Maintenance for signs that require power and communications to operate may be costly.

Other considerations

This package has limited right of way, geotechnical and environmental impacts.

The Older Drivers and Pedestrians Special Rule may apply for some areas where this package could be installed.

Range for Total Package Construction Cost

\$1.8 - \$2.34 million with current assumptions:

- ◆ *Delineators at 15% of intersections and driveways*
- ◆ *Delineators along all curves*
- ◆ *Updating missing or old signs*
- ◆ *120 miscellaneous signs*

This is a baseline cost that could increase if other elements or more locations are added. The study team made general assumptions about which locations require the improvements in this package, but more work is needed to refine the project scope before implementation.

A full list of assumptions used to estimate the order-of-magnitude total construction cost for this package can be found in Appendix C.



PACKAGE B: CORRIDOR PAVEMENT MARKINGS

Description

Update and maintain highly retroreflective roadway striping throughout the corridor to ensure visibility, including recessed pavement markers. Update pavement markings to meet all current standards including stripe types, pavement marking materials and stripe widths.

In areas with existing roadway width to restripe, convert wide shoulders or non-standard passing lanes to chain-up areas for winter conditions.

Restripe areas near communities and areas with more destinations to reinforce slower speeds. Minimize passing opportunities in these areas and provide a buffered shoulder when possible.

Safety issues addressed

- Finding and accessing recreational destinations and communities
- Curves
- Safer passing opportunities
- Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- Communications
- Risky driving behaviors

General benefits

- ◆ Increased visibility of lanes and curves.
- ◆ Support toward slower speeds through communities.
- ◆ Using existing space to provide additional chain-up areas.
- ◆ Quantitative benefits detailed in Technical Memorandum #5 (Appendix B).



Photo: 3M

Implementation considerations

Large systemic safety projects have historically included both signing and new or enhanced pavement markings. If funding allows, all or some of the work included in Package A could be included with Package B. Much of this package could be considered maintenance efforts, but there is need above and beyond normal maintenance efforts for striping along the corridor. If pavement rehabilitation work is planned, this work should be coordinated with those efforts.

Maintenance considerations

Adding new striping to OR 6 will increase maintenance costs.

Other considerations

There are no anticipated right of way, geotechnical or environmental impacts for this package.

The Older Drivers and Pedestrians Special Rule may apply for some areas where this package could be installed.

Range for Total Package Construction Cost

\$7.3 - \$9.49 million assuming new or enhanced pavement markings for the entire length of the corridor.

This baseline cost could increase if other elements or more locations are added. The study team made general assumptions about which locations require the improvements in this package, but more work is needed to refine the project scope before implementation.

Assumptions used to estimate the order-of-magnitude total construction cost for this package can be found in Appendix C.



PACKAGE C: RUMBLE STRIPS

Description

Install rumble strips in the following locations:

- ◆ Along the outside of the travel lane to inform drivers if they leave the lane (shoulder rumble strips).
- ◆ Along the centerline of the roadway to inform drivers if they enter the oncoming travel lane (centerline rumble strips). Install along no-pass zones as well as curves.

Pavement must be rehabilitated before rumble strips can be installed. Modified rumble strips may be used to reduce noise impacts in residential areas.

Safety issues addressed

- ◆ Finding and accessing recreational destinations and communities
- Curves
- ◆ Safer passing opportunities
- ◆ Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- ◆ Communications
- Risky driving behaviors

General benefits

- ◆ Warning drivers when they leave their lane or the roadway and could be endangering themselves and others.
- ◆ Quantitative benefits detailed in Technical Memorandum #5 (Appendix B).



Photo: FHWA

Implementation considerations

- ◆ Pavement must be rehabilitated before rumble strip installation. The cost for pavement rehabilitation varies. Pavement rehabilitation costs are not included in this package's cost estimate (see Package G, Project G1 for more information).
- ◆ May include items from Package B such as recessed pavement markers.
- ◆ A rumble strip project has been funded through design in ODOT's STIP. Construction funding is still in the process of being identified.

Maintenance considerations

There are no major maintenance considerations for this package. It is worth noting that pavement maintenance is already difficult to fund for this corridor.

Other considerations

There are no anticipated right of way, geotechnical or environmental impacts for this package. Shoulder rumble strip locations need to be reviewed for adequate shoulder width and proximity to residences. Centerline rumble strip locations need to be reviewed for proximity to residences.

Range for Total Package Construction Cost

\$1.2 - \$1.56 million with current assumptions that shoulder rumble strips and centerline rumble strips are installed at all locations in corridor that meet installation guidelines.

Pavement rehabilitation is excluded from estimate.

This baseline cost could increase if other elements such as pavement rehabilitation or more locations are added. Pavement in poor and fair condition would need to be remediated, including unstable slopes listed in Package F, for rumble strips to be implemented corridor-wide.

Assumptions used to estimate the order-of-magnitude total construction cost for this package can be found in Appendix C.

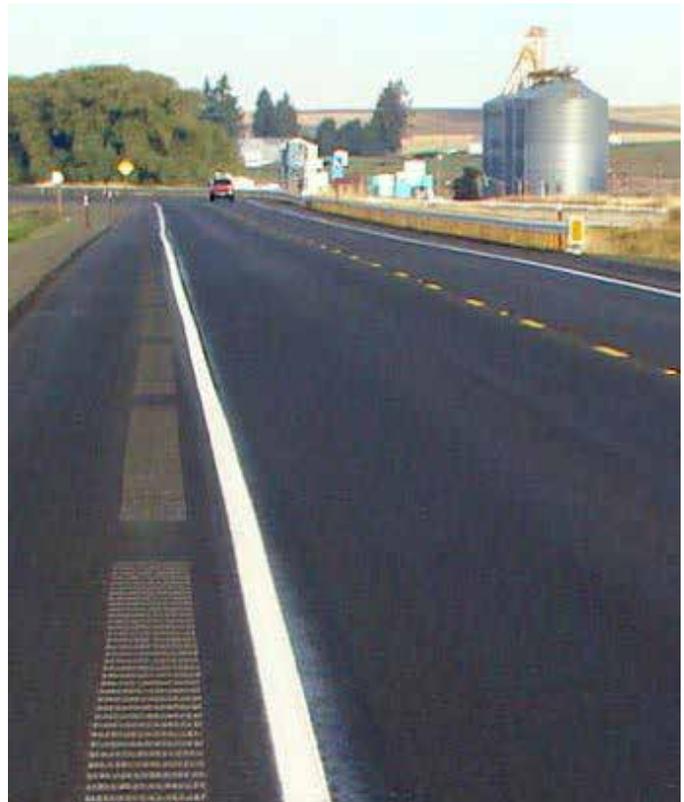


Photo: FHWA

PACKAGE D: INTELLIGENT TRANSPORTATION SYSTEM AND COMMUNICATIONS

Description

Expand ITS and communications devices throughout the corridor, contingent on fiber installation and utility companies. Types of devices that are recommended as part of a safety-focused systemic project include:

- ◆ A weather warning system that allows drivers to look up current conditions and warns them when an alternative route is recommended or conditions are difficult.
- ◆ Traffic cameras to reflect road conditions through applications such as TripCheck.
- ◆ Variable message signs to warn drivers of incidents or conditions ahead, provide travel times or emphasize the need to drive safely.
- ◆ A variable speed guidance system that adjusts speed limits based on winter weather.

Safety issues addressed

- Finding and accessing recreational destinations and communities
- Curves
- Safer passing opportunities
- Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- Communications
- Risky driving behaviors

General benefits

- ◆ Increased driver awareness of roadway conditions.
- ◆ Warning drivers of incidents and conditions in time to reroute if necessary.



Photo: Kittelson & Associates

Implementation considerations

Fiber communication must be installed for this package to be completed — a public-private partnership effort that relies on parties outside of ODOT.

Maintenance considerations

Adding signs and delineators to the corridor will increase maintenance costs. Maintenance for signs that require power and communications to operate may be costly.

Other considerations

There are potential right of way, geotechnical or environmental impacts for this package, especially for larger signs or signs that require power and communications to operate.

The Older Drivers and Pedestrians Special Rule may apply for some areas where this package could be installed.

Range for Total Package Construction Cost

\$2.0 - \$2.6 million with current assumptions:

- ◆ 2 weather warning signs
- ◆ 2 variable message signs

This baseline cost could increase if other elements or more locations are added and ongoing coordination with ODOT is recommended to determine future prices.

This estimate does not include the fiber communications project that is a prerequisite for completing this package.

Assumptions used to estimate the order-of-magnitude total construction cost for this package can be found in Appendix C.



Package E: Passing Opportunities Capital Projects

This package includes several capital project options to address passing opportunities along OR 6. The study team investigated multiple passing opportunity solutions for Technical Memorandum #5 Potential Corridor Solutions. The team reviewed and presented these solutions as two potential projects with different approaches to creating additional passing opportunities.

Project E1 focuses on eliminating unsafe passing opportunities and constructing new passing opportunities where it is most economical. Project E2 focuses on constructing passing/climbing lanes on both sides of the highway and over the summit.

No matter which projects move forward, together or separately, constructing new passing lanes that meet ODOT standards along OR 6 between Banks and Tillamook will require significant investment. Though there are opportunities to improve existing passing/climbing lanes and introduce new passing opportunities, it may not be possible to build them all.

Each option has unique associated benefits and challenges. ODOT will need to consider which option is likely to yield the largest return on investment.



PROJECT E1: LONGER PASSING OPPORTUNITIES

Description

Project E1 focuses on evaluating short passing opportunities and constructing longer ones where most economical. As shown on page 28, it includes the following elements:

- ◆ Investigate the short westbound passing/climbing lanes to determine how to reallocate the existing pavement.
- ◆ From milepost 16.0 to 16.4, **a new 0.4-mile passing lane will replace the slow-moving vehicle turnout in the eastbound direction and the westbound passing lane will be maintained.**
- ◆ From milepost 37.5 to milepost 38.5, **new 1-mile passing lanes will be constructed in both the eastbound and westbound directions.**

Safety issues addressed

- Finding and accessing recreational destinations and communities
- Curves
- Safer passing opportunities
- Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- Communications
- Risky driving behaviors

General benefits

- ◆ Reduces the risk associated with short passing/climbing lanes by reallocating the pavement associated with the westbound passing/climbing lanes. The three short westbound passing/climbing lanes are within a segment where trucks are likely to travel slower than typical.
- ◆ Focuses on investing in passing opportunities away from the summit where it is more economical to widen the existing roadway.

Implementation considerations

This project excludes repairing the unstable slopes near the summit because it's possible to construct new passing lanes where it is more economical to do so.

Maintenance considerations

Adding new roadway width and signs to the corridor will increase maintenance costs.

Other considerations

There are right of way, geotechnical and environmental impacts for this project.

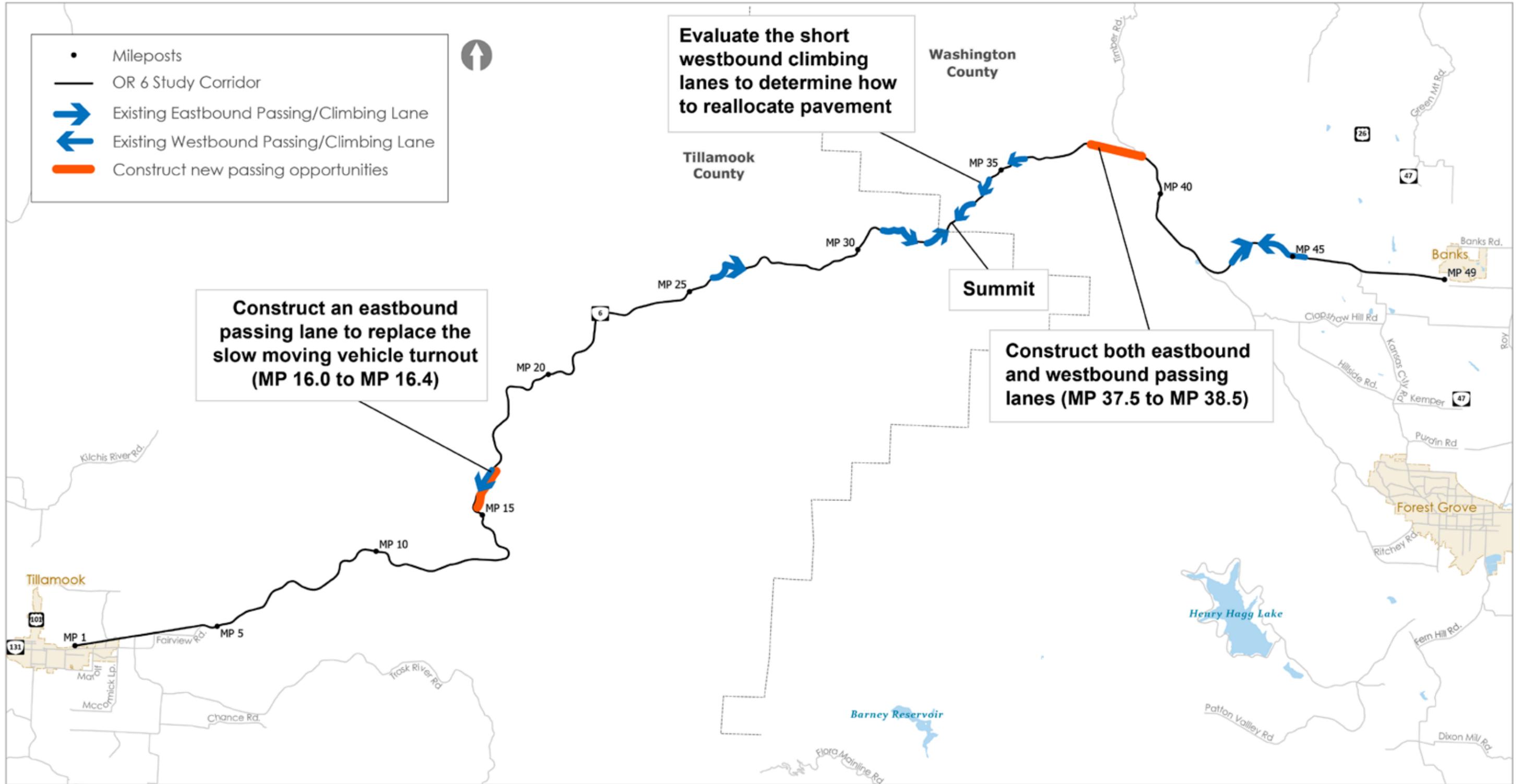
Range for Total Package Construction Cost

\$35.0 - \$45.5 million with current assumptions.

This baseline cost could increase if more elements or locations are added. An additional \$40.9 million would be required to fix all unstable slopes within the limits of the substandard passing lanes. However, there are no unstable slopes in the two additional passing lane locations.

Assumptions used to estimate the order-of-magnitude total construction cost for this package can be found in Appendix C.

Project E1: Longer Passing Opportunities



PROJECT E2: FULL CLIMBING LANES OVER THE SUMMIT

Description

This project connects and extends all existing passing/climbing lanes over the summit, as shown on page 30. This allows the eastbound passing/climbing lanes to end on the straight segment of OR 6 just past the summit, resulting in an eastbound climbing lane from milepost 30.88 to milepost 33.32. The westbound passing/climbing lane will also be extended past the summit, resulting in a westbound passing/climbing lane from milepost 32.27 to milepost 35.70.

Safety issues addressed

- Finding and accessing recreational destinations and communities
- Curves
- Safer passing opportunities**
- Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- Communications
- Risky driving behaviors

General benefits

- ◆ Reduced risk associated with short passing/climbing lanes (higher speed differentials, short merges).
- ◆ Lower speed differential at the merge on the downhill side of the summit due to extending the passing/climbing lane over the summit.
- ◆ Improved sight distance and awareness of the end of passing opportunities due to locating the start and end of passing/climbing lanes on straight segments of OR 6.
- ◆ The extension over the summit will provide passing opportunities the full length of the segment with the greatest speed differentials.

Implementation considerations

If the passing/climbing lanes are constructed over the summit, then the existing bridge over Devils Lake Fork Creek will need to be widened or reconstructed.

If the passing/climbing lanes are constructed, then it would be practical to repair all of the unstable slopes within the project limits for long-term impact.

Maintenance considerations

Having more roadway width to maintain will increase maintenance costs. However, the project's pavement reconstructions will reduce recurring maintenance costs.

Other considerations

There are right of way, geotechnical and/or environmental impacts for this project.

Range for Total Package Construction Cost

\$102.8 - \$133.64 million with current assumptions.

This baseline cost could increase if more elements or locations are added, including the cost to fix all unstable slopes within the project limits.

Assumptions used to estimate the order-of-magnitude total construction cost for this package can be found in Appendix C.

PACKAGE F: UNSTABLE SLOPES REMEDIATION

Description

Address the 18 priority unstable slopes along OR 6 based on ODOT's Geotechnical Report. Fourteen of the 18 priority locations are located between milepost 31 and milepost 35.

Safety issues addressed

- Finding and accessing recreational destinations and communities
- Curves
- Safer passing opportunities
- Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- Communications
- Risky driving behaviors

General benefits

- ◆ Reduced frequency of landslides and other unstable slope events.
- ◆ Less ODOT maintenance staff time needed for these locations.
- ◆ Reduced uneven pavement condition and impacts on drivers.
- ◆ Increased driver comfort and driver expectations of road conditions.
- ◆ Allows for other safety improvements to be implemented



Implementation considerations

Many of the roadway condition issues seen on OR 6 stem from the unstable slopes, especially in the summit area (milepost 31 to milepost 35). Unstable slopes would need to be addressed before spending time and money to implement other projects that do not address the root cause of many of the issues along the corridor.

Maintenance considerations

If the unstable slopes are addressed, ODOT will spend less time on maintenance in these areas.

Other considerations

Large-scale right of way, geotechnical and environmental impacts are anticipated for this package.

Range for Total Package Construction Cost

\$38 - \$49.4 million with current assumptions, but ongoing coordination with ODOT recommended for future cost estimating.

This baseline cost could increase if more elements or locations are added.

Assumptions used to estimate the order-of-magnitude total construction cost for this package can be found in Appendix C.

Package G: Other Large Capital Projects

PROJECT G1: PAVEMENT REHABILITATION PROJECT

Description

Improve pavement segments in poor or fair condition.

Poor-condition pavement segments will likely require significant pavement rehabilitation such as full replacement of the existing roadway. Based on current data, these sections include:

- ◆ Milepost 4.40 – 11.80
- ◆ Milepost 32.96 – 35.20

Fair condition pavements will likely require moderate pavement rehabilitation such as grinding existing pavement and repaving. Based on current data, these sections include:

- ◆ Milepost 27.80 – 32.96
- ◆ Milepost 35.20 – 37.61

Safety issues addressed



General benefits

- ◆ Decreased hazards on the road.
- ◆ Increased comfort for drivers.
- ◆ Improved pavement performance in wet conditions.
- ◆ Quantitative benefits detailed in Technical Memorandum #5 (Appendix B).

Implementation considerations

- ◆ If unstable slopes will be addressed in a project in the near future, this project should be delayed to minimize redundant work. Consider adding geogrid or other pavement reinforcement to the pavement as part of a paving project to extend the pavement's life.
- ◆ Superelevation corrections are only included in a 3R or 4R project.

Maintenance considerations

Pavement maintenance is already difficult to fund for this corridor.

Other considerations

There are no anticipated right of way, geotechnical or environmental impacts for this package, assuming the pavement will stay within existing pavement footprint.

Range for Total Package Construction Cost

Poor pavement locations: \$33.8 - \$43.94 million with current assumptions.

Fair pavement locations: \$7.6 - \$9.88 million with current assumptions.

These baseline costs could increase if more elements or locations are added. There would be an additional cost to repair the unstable slopes within the pavement limits.

Assumptions used to estimate the order-of-magnitude total construction cost for this package can be found in Appendix C.

PROJECT G2: WILSON RIVER LOOP INTERSECTION PROJECT

Description

The near-term option for this intersection includes creating a 12-foot buffer between the westbound through travel lane and the right-turn lane as shown on page 34.

An intersection control evaluation will be completed as part of this project to determine future intersection improvements.

Safety issues addressed

- Finding and accessing recreational destinations and communities
- Curves
- Safer passing opportunities
- Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- Communications
- Risky driving behaviors

General benefits

- ◆ Improved sight distance for southbound vehicles.
- ◆ Quantitative benefits detailed in Technical Memorandum #5 (Appendix B).

Implementation considerations

A modified right turn lane project has been funded through design in ODOT's STIP. Construction funding is still in the process of being identified.

ODOT plans to build this project and will have a better idea of the construction schedule and cost as the project gets further in design. While currently not funded, ODOT estimates starting construction in 2026.

Maintenance considerations

Minimal additional maintenance costs may be incurred with the additional asphalt.

Other considerations

No right of way costs are anticipated because the Wilson River Loop realignment project acquired significant right of way widths in this area to account for the wetland mitigation and highway improvement locations.

The weigh station is located just east of this intersection, creating a weave section approximately 900 feet long. This project must balance achieving separation between the right-turn lane and through lane with allowing an adequate length for accelerating trucks to merge back into the through lane.

There is a utility pole that is likely in the clear zone for the offset right-turn lane. Guardrail will be needed to protect traffic from this object in the clear zone or it will have to be relocated.

This area is near the headwaters of Hoquarten Slough and wetlands mapped in the Tillamook Local Wetland Inventory and the National Wetland Inventory. Minor retaining walls may be required to avoid wetland impacts within the project limits.

Range for Total Package Construction Cost

\$3.9 - \$5.07 million with current assumptions.

This baseline cost could increase if more elements or locations are added.

Assumptions used to estimate the order-of-magnitude total construction cost for this package can be found in Appendix C.

Project G2: Wilson River Loop Intersection Project

Concept Design Subject to Change



PROJECT G3: GALES CREEK INTERSECTION PROJECT

Description

Install delineators, additional intersection warning signage and striping, and an actuated intersection warning system to increase intersection awareness for drivers, as shown on page 36. The actuated intersection warning system would alert drivers traveling westbound on OR 6 if there is a vehicle stopped in the travel lane to turn left onto Gales Creek Road.

As part of the project, assess future needs and evaluate feasibility of constructing a potential westbound left-turn lane.

Safety issues addressed

- Finding and accessing recreational destinations and communities
- Curves
- Safer passing opportunities
- Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- Communications
- Risky driving behaviors

General benefits

- ◆ Increased visibility and awareness of the intersection and drivers' presence on the upcoming roadway.
- ◆ Quantitative benefits detailed in Technical Memorandum #5 (Appendix B).



Implementation considerations

Power and communications will be needed to operate non-static signs, such as the actuated intersection warning system.

Maintenance considerations

Signs and delineators added to the corridor will increase maintenance costs. Maintenance for signs that require power and communications to operate may be costly.

Other considerations

There are potential right of way, geotechnical or environmental impacts for this package, especially for larger signs or signs that require power to operate.

Range for Total Package Construction Cost

\$0.4 - \$0.52 million with current assumptions.

This baseline cost could increase if more elements or locations are added.

Assumptions used to estimate the order-of-magnitude total construction cost for this package can be found in Appendix C.

PROJECT G4: SUMMIT SAFETY AND PAVING PROJECT

Description

The summit project focuses on OR 6 from approximately milepost 31 to milepost 35. Install delineators to define the roadway. Install a weather warning system, including temperature gauges, cameras and variable message signs. Complete full pavement reconstruction, including installing recessed pavement markers. Evaluate Packages E (passing opportunities) and Package F (pavement rehabilitation) for items to include in the broader Summit project.

Safety issues addressed

- Finding and accessing recreational destinations and communities
- Curves
- Safer passing opportunities
- Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- Communications
- Risky driving behaviors

General benefits

- ◆ Increased visibility and awareness of roadway conditions and context.
- ◆ Improved pavement performance in wet conditions.
- ◆ Quantitative benefits detailed in Technical Memorandum #5 (Appendix B).

Implementation considerations

This package does not include fixing unstable slopes. If unstable slopes will be addressed in a project in the near future (such as Package F), the summit should be addressed afterward to minimize redundant work. This package also does not include modifying passing opportunities, which is covered in Package E and would impact the corridor summit.

Maintenance considerations

New delineators added to the corridor will increase maintenance costs. Maintenance for signs that require power and communications to operate may be costly.

Other considerations

There are potential right of way, geotechnical or environmental impacts for this package, especially for larger signs or signs that require power to operate.

Range for Total Package Construction Cost

\$13.3 - \$17.29 million with current assumptions:

- ◆ Delineators throughout segment
- ◆ Recessed pavement markers throughout segment
- ◆ Pavement rehabilitation (excluding unstable slopes)
- ◆ Weather warning system

This baseline cost could increase if more elements or locations are added.

Assumptions used to estimate the order-of-magnitude total construction cost for this package can be found in Appendix C.

PACKAGE H: STRATEGIES TO ADDRESS BEHAVIORAL COMPONENTS

Description

Conduct a safe driving media campaign and evaluate funding opportunities for increased enforcement. Consider installing speed feedback signs along more developed areas of the corridor that report driver speed compared to posted speed. Speed feedback signs are not typically operated or maintained by ODOT; partnerships with other agencies will be needed.

Safety issues addressed

- Finding and accessing recreational destinations and communities
- Curves
- Safer passing opportunities
- Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- Communications
- Risky driving behaviors**

General benefits

- ◆ Increased driver awareness of how they impact their own safety and that of others when traveling on OR 6.

Implementation considerations

- ◆ Enforcement, including speed feedback signs, is a multi-jurisdictional effort that relies on parties outside of ODOT.
- ◆ Power needs to be provided to operate non-static signs, such as speed feedback signs.

Maintenance considerations

Speed feedback signs typically are not funded or installed by ODOT, and ODOT is not typically responsible for operations or maintenance. Maintenance for signs that require power and communications to operate may be costly.

Other considerations

Even if additional funding is secured for enforcement, staff shortages and prioritizing staff covering large regions may make it impossible for more enforcement to be stationed on OR 6 consistently.

There are no anticipated right of way, geotechnical or environmental impacts for this package.

The Older Drivers and Pedestrians Special Rule may apply for some areas where this package could be installed.

Cost Considerations

The cost for this package will vary based on the amount of staff time ODOT and local law enforcement can allocate to these efforts.



PACKAGE I: POLICIES OR LONG-TERM STUDIES

Description

Complete policies or long-term studies that help address safety issues on OR 6 related to finding and accessing recreational destinations and communities, the lack of passing opportunities and navigating roadway conditions.

Policies and long-term studies to complete include:

- ◆ Establish access management principles and strategies: Minimize conflict points along the corridor by defining access points with curb or paint; encouraging appropriate use of parking areas along the side of the road; increasing awareness and visibility of parking areas through signage; and partnering with other agencies to encourage defined parking areas near destinations (such as trailheads or retail locations).
- ◆ Complete passing opportunities evaluation. Evaluate passing lane lengths, taper lengths and other existing conditions within passing lanes against current standards.
- ◆ Continue to evaluate OR 6 against the safety corridor designation. Review the Safety Corridor designation criteria to determine if a section of the corridor meets the criteria.

Safety issues addressed

- Finding and accessing recreational destinations and communities
- Curves
- Safer passing opportunities
- Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- Communications
- Risky driving behaviors

General benefits

- ◆ Reducing driver confusion for access points off OR 6.
- ◆ Providing convenient and standard passing opportunities.
- ◆ Providing additional support to the corridor through special safety-related designations.

Cost considerations

The cost for this package will vary based on the amount of staff time ODOT and other applicable agencies can allocate to these efforts.

PACKAGE J: IDENTIFICATION OF FUNDING NEEDS

Description

Evaluate funding opportunities and look for occasions to partner with other agencies to increase maintenance and enforcement.

Safety issues addressed

- Finding and accessing recreational destinations and communities
- Curves
- Safer passing opportunities
- Roadway conditions (wet, snow, ice)
- Pavement/slope stability conditions
- Communications
- Risky driving behaviors

General benefits

Reducing the maintenance budget gap to address roadway conditions before they cause safety issues.

Implementation considerations

Many of the recommendations from this study will result in increased maintenance costs and be contingent on increasing the ODOT maintenance budget, further emphasizing the need for more funding. Maintaining the roadway is critical to extending the life of capital investments and therefore saving money in the long run.

ODOT should look for opportunities to pursue new funding opportunities as well as consider partnering with other agencies and private entities to accomplish funding needs.

Cost considerations

The cost for this package will vary based on the amount of new funds ODOT and other agencies are able to acquire.



Future Considerations

ODOT does not currently have funding through construction for any of the project packages and associated solutions identified through the study. If funding becomes available, the cost and time it will take to implement the packages will depend on which ones are chosen.

Potential methods for funding improvements to OR 6 include:

- ◆ State legislation to provide funding
- ◆ State funding programs
- ◆ Federal funding programs

State and Federal funding programs tend to focus on higher order highways such as US and interstate highways. These funding sources are scarce and may not be depended on to fund projects on OR 6.

In addition to the solutions presented in this document, there are other ongoing efforts for the OR 6 corridor that need support from the legislature, ODOT and local partner agencies. This includes the effort to establish fiber communications and cellphone coverage along the corridor. The large unserved area in the middle of the corridor is a barrier for community members trying to report incidents that occur on the roadway.

ODOT can leverage these projects to establish some of the solutions discussed in this document, such as speed feedback signs, weather warning systems and other ITS devices that would require power and/or communications.





JCT

6

DETOUR

Heavy Haul Trucks
Use 6 East
NEXT RIGHT

2 HR PARKING
9AM-5PM
EXCEPT SUNDAYS & HOLIDAYS

NO PARKING
EXCEPT BY PERMIT
EMPLOYEE PARKING

Trees to Sea
Scenic Byway

Regular 3.19
Plus 4.03
Max 4.29
Food Mart

LAUND

500
LOC