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TECHNICAL MEMORANDUM #3

DATE: April 1, 2024

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SUBJECT: OR 42-US 101 Passing Lanes Study
Agency Report

DKS P#22129-004

INTRODUCTION

OR 42 (Coos Bay-Roseburg Highway No. 35) and US 101 (Oregon Coast Highway No. 9) are key transportation corridors in southwest Oregon. OR 42 is a primary east-west route between Interstate 5 and the Oregon Coast, and US 101 is the primary north-south route along the coast. Because these highways are important freight and tourism routes for travelers in Oregon, they are expected to see increased heavy vehicle traffic in the next twenty years. These corridors carry traffic volumes that are approximately 25 percent higher during the summer[1] compared to other times due to the additional recreational and tourism activity. Improvement projects are needed on these corridors to accommodate future growth and aid safe, efficient travel in Oregon's southwest region.

The goal of the OR 42-US 101 Passing Lanes Study is to determine where additional passing lanes would improve movement on OR 42 and US 101 and identify projects for funding and implementation. The purpose of this memo is to define passing opportunities, identify applicable standards, and summarize existing conditions on the study corridors.

[1] Seasonal fluctuations vary by location along the corridor and are based on permanent count station data. The six permanent count stations on US 101 indicate that summer traffic volumes are 17 to 35 percent higher than the average annual daily traffic. The one count station on OR 42 (located west of Winston) indicates that summer months are approximately 15 percent higher than the average annual daily traffic.

DEFINITION OF PASSING OPPORTUNITIES

Corridors with a high percentage of heavy vehicles, such as semitrucks and recreational vehicles, often face issues when drivers are unable to pass slower vehicles. This is especially true on facilities that have long stretches of winding roadway or steep grades, which results in these vehicles not being able to maintain posted speeds. Behind heavy vehicles that travel at lower speeds, platoons (a line of vehicles closely following each other) may develop. Passing opportunities are essential to disperse platoons of vehicles and facilitate safe, efficient travel. Passing zones, passing lanes, and slow vehicle turnouts are the three most common treatments for passing opportunities installed on Oregon highways.

PASSING ZONES

Passing zones are segments of a roadway within which drivers may temporarily move into the lane of opposing traffic to overtake slower vehicles. Although passing zones often benefit a corridor's traffic operations, the ODOT Safety Investigation Manual[2] has noted that insufficient passing zone lengths increase the risk of certain types of crashes between vehicles traveling in the same, and opposite, directions.

Passing zones are common on rural highways, but the nature of such maneuvers requires minimum sight distances. The AASHTO Green Book[3] provides minimum passing sight distances for use in design, which are based on those presented in the Manual on Uniform Traffic Control Devices (MUTCD)[4] as warrants for no-passing zones on highways. The AASHTO values are shown in Table 1 and the MUTCD (Table 3B-1) values are shown in

Table 2.

TABLE 1. PASSING SIGHT DISTANCE FOR DESIGN OF TWO-LANE HIGHWAYS, AASHTO

DESIGN SPEED	ASSUMED SPEEDS		PASSING SIGHT DISTANCE
	Passed Vehicle	*Passing Vehicle*	
20 MPH	8 mph	20 mph	400 ft
25 MPH	13 mph	25 mph	450 ft
30 MPH	18 mph	30 mph	500 ft
35 MPH	23 mph	35 mph	550 ft

[2] Safety Investigation Manual, Oregon Department of Transportation. January 2022.

[3] Policy on Geometric Design of Highways and Streets, 7th Edition, American Association of State Highway and Transportation Officials. September 2018.

[4] Manual on Uniform Traffic Control Devices, Federal Highway Administration. July 2022.

DESIGN SPEED	ASSUMED SPEEDS		PASSING SIGHT DISTANCE
	Passed Vehicle	*Passing Vehicle*	
40 MPH	28 mph	40 mph	600 ft
45 MPH	33 mph	45 mph	700 ft
50 MPH	38 mph	50 mph	800 ft
55 MPH	43 mph	55 mph	900 ft
60 MPH	48 mph	60 mph	1,000 ft
65 MPH	53 mph	65 mph	1,100 ft
70 MPH	58 mph	70 mph	1,200 ft
75 MPH	63 mph	75 mph	1,300 ft
80 MPH	68 mph	80 mph	1,400 ft

TABLE 2. MINIMUM PASSING SIGHT DISTANCES FOR NO-PASSING ZONE MARKINGS, MUTCD

85TH-PERCENTILE OR POSTED OR STATUTORY SPEED LIMIT (MPH)	MINIMUM PASSING SIGHT DISTANCE (FT)
25	450
30	500
35	550
40	600
45	700
50	800
55	900
60	1,000
65	1,100
70	1,200

PASSING LANES

Where passing zones are not feasible along a roadway, passing lanes may be appropriate to provide vehicles an opportunity to pass slower moving vehicles. Due to topography and existing roadway design, segments with sufficient passing sight distance to allow passing zones may not be frequent enough to maintain desired levels of service. For example, as shown in Figure 1, the MUTCD provides guidance for no-passing zones on segments with sight distance limitations due to horizontal and vertical curves. In such situations, passing lanes are a useful method to provide more passing opportunities. Passing lanes generally provide a safer passing opportunity than passing zones because they limit drivers crossing the center of a roadway when overtaking slower vehicles. When passing lanes are on sections of steep or extended upgrades, they are referred to as climbing lanes.

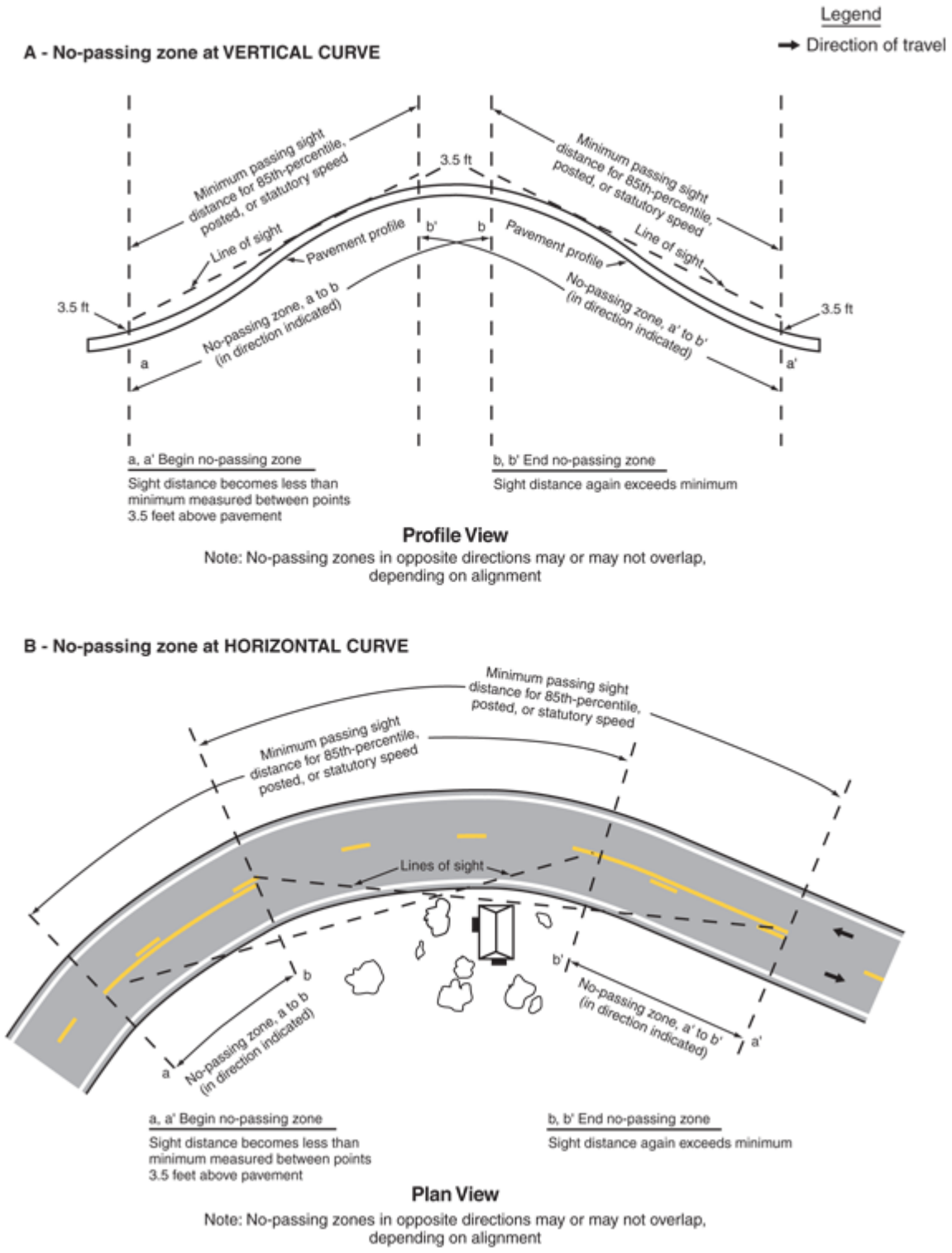


FIGURE 1. DETERMINING THE LIMITS OF NO-PASSING ZONES AT CURVES

SLOW-VEHICLE TURNOUTS

Slow-moving vehicle turnouts share some features with passing lanes but are functionally different. Rather than operating as an added travel lane, slow moving vehicle turnouts allow vehicles to exit the travel lane to allow followers to pass. Slow-moving vehicle turnouts are typically separated from the travel lane by a solid white line indicating vehicles should only enter and exit the turnout at the dashed tapers.

While slow-moving vehicle turnouts exist in Oregon, these are largely legacy facilities, as new installations are not encouraged. According to the ODOT Traffic Line Manual[5], such turnouts are not considered adequate for passing because they:

- *Rely on the cooperation of slower drivers,*
- *Are generally too short to completely break up an established queue,*
- *Have little established impact on percentage of following vehicles, and*
- *May not provide a net reduction in delay on the highway.*

As such, ODOT requires a roadway design exception for new slow moving vehicle turnouts.

Passing lanes are preferred to slow-moving vehicle turnouts. However, where there is not enough available space for optimal passing lane lengths, or where the cost of a passing or climbing lane is too much, slow-moving vehicle turnouts may be a feasible alternative.

SUMMARY OF EXISTING LAWS, RULES, AND REGULATIONS

There are limited legal requirements regarding agency use of passing lanes. Although implementation and design guidelines for passing lanes do exist (and are summarized in the next section), they are not required by federal or state law.

Federal, state, and local policies pertaining to this project are listed below. Potential passing lanes must comply with these documents.

- OR 38/OR 42 Corridor Plan
- Douglas County Transportation System Plan
- Coos County Transportation System Plan
- Curry County Transportation System Plan
- Other Comprehensive Plans and Transportation System Plans
- Oregon Highway Plan

The Oregon Coast Bike Route was also considered, but it does not provide any regulations regarding passing lanes along the bike route.

[5] Traffic Line Manual, Oregon Department of Transportation. January 2023.

SUMMARY OF CURRENT STANDARDS AND TARGETS

Passing lane design standards are an important consideration for prioritizing future passing lane locations. A review of national, state, and local resources for passing lane standards is summarized below.

NATIONAL RESOURCES

The Highway Capacity Manual (HCM)[6] provides optimal passing lane lengths based on traffic flow rates. These lengths are derived from simulations and represent the lane lengths at which the decrease in percent following vehicles is maximized per unit of distance. At longer lengths, there is a diminishing return regarding the number of followers. ODOT's Analysis Procedures Manual[7] cites these values, which are shown in

Table 3.

TABLE 3. OPTIMAL PASSING LANE LENGTHS, HCM 7TH EDITION

TRAFFIC FLOW RATE ENTERING PASSING LANE (VEHICLES/HOUR)	200	300	400	500	600	700	800
OPTIMUM PASSING LANE LENGTH (MILES)	0.9	1.0	1.2	1.2	1.6	1.9	2.0

The AASHTO Green Book also states optimal passing lane lengths based on traffic operations. These values are shown in Table 4.

TABLE 4. OPTIMAL PASSING LANE LENGTHS, AASHTO GREEN BOOK

ONE-WAY FLOW RATE (VEHICLES/HOUR)	100-200	201-400	401-700	701-1,200
OPTIMAL PASSING LANE LENGTH (MILES)	0.50	0.50-0.75	0.75-1.00	1.00-2.00

The shortest optimal length is intended to allow a following vehicle to complete at least one passing maneuver. Once the length of a proposed passing lane is determined, the design of the lane tapers should be analyzed. Here, sight distance is again a priority, especially in designs where the opposing travel lane is still permitted to pass. The AASHTO Green Book recommends a minimum sight distance of 1,000 feet at both lane addition and lane drop tapers. Furthermore, the number of intersections and high-volume driveways should be minimized along segments with passing lanes. Physical barriers to continuous shoulders (bridges, culverts, etc.) should also be avoided within passing lanes sections, as shoulders can provide needed buffers for certain maneuvers.

[6] Highway Capacity Manual, 7th Edition, Transportation Research Board. 2022.

[7] Analysis Procedures Manual, Version 2, Oregon Department of Transportation. September 2023.

STATE RESOURCES

Regarding the length of a passing lane, the OR 38/OR 42 Corridor Study, completed in 2001, echoes the lower bound guidance in the AASHTO Green Book, stating that "passing lanes should be at least 0.5 mile in length".

ODOT provides general guidance on the application of passing lanes in Section 503 of the ODOT Traffic Manual, including:

- References the Highway Design Manual for standards and guidelines
- Climbing and passing lanes are not a delegated authority of the state traffic engineer and do not require state traffic engineer approval.
- Current ODOT policy does not allow construction of new slow vehicle turnouts without a design exception.

ODOT provides standards on the geometry of passing lanes. Section 328 of the ODOT Highway Design Manual[8] lists the following geometric standards for passing lanes.

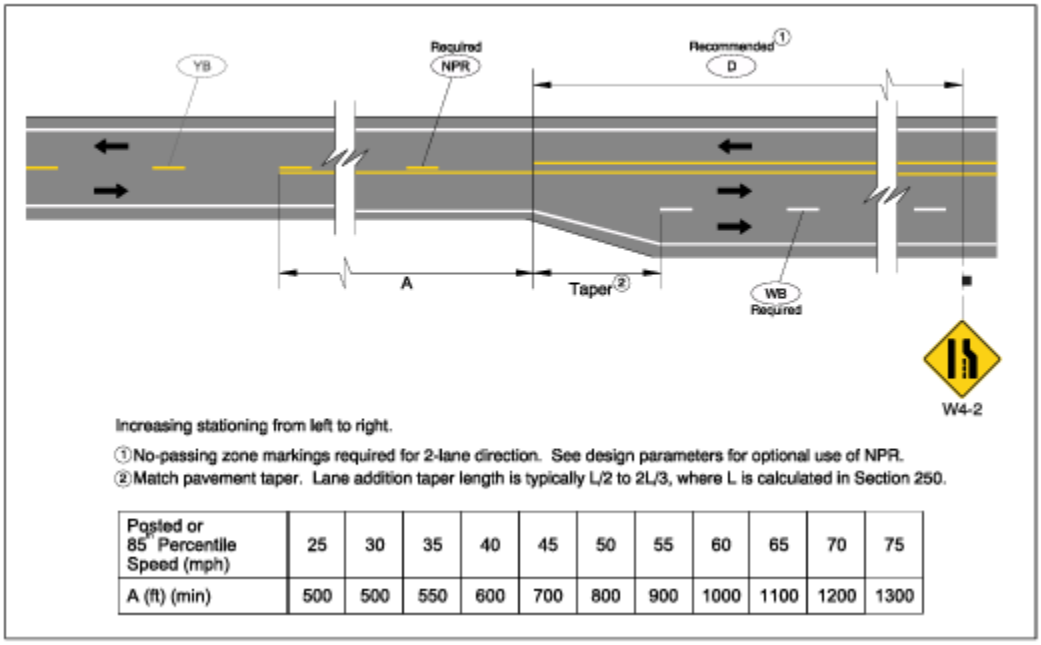
- The standard travel lane for a passing lane section is 12 feet. The desirable shoulder width should be 6 feet with a minimum of 4 feet.
- The minimum median width in a passing lane section (three or four lanes) shall be 2 feet.
- Passing lanes should be located where there are no side-street or driveway approaches.
- Taper length: L = W*S where W = width in feet and S = posted speed in mph

An upcoming draft of this manual is anticipated in 2024; a review of the draft revealed no significant differences from the existing guidelines.

Section 251 of the ODOT Traffic Line Manual provides further standards on the geometry of lane addition tapers, as well as no-passing zones surrounding a three-lane segment. Figure 2 shows some of these requirements based on the Traffic Line Manual. Passing may or may not be allowed for the single-lane direction opposing the passing lane along such a segment.

[8] Highway Design Manual, Oregon Department of Transportation. 2023.

Figure 251: Typical Lane Addition Transition & 3-Lane 2-Way Passing Allowances



Posted or 85th Percentile Speed (mph)	25	30	35	40	45	50	55	60	65	70	75
A (ft) (min)	500	500	550	600	700	800	900	1000	1100	1200	1300

FIGURE 2. PASSING LANE ADDITION STANDARDS, ODOT TRAFFIC LINE MANUAL

LOCAL CONTEXT

Efforts have already been made to identify segments of OR 42 that are candidates for passing lanes. The OR 38/OR 42 Corridor Study identifies locations on OR 42 that should be considered for the addition of a passing lane. These locations are listed in Table 5 and Table 6.

Given the cost of constructing passing lanes, the corridor study emphasized that the goal should be to identify a few locations where a passing lane would specifically address existing or anticipated capacity, safety concerns, and corridor travel times. The ODOT Analysis Procedures Manual notes that passing lanes do not impact system capacity, but rather only the capacity of a segment with a passing lane, so extensive passing lanes may be needed for corridor capacity improvements.

TABLE 5. OR 38/OR 42 CORRIDOR STUDY – RECOMMENDED PASSING LANE IMPROVEMENTS ON OR 42

LOCATION	BEGIN MP	END MP	DESCRIPTION
CHROME PLANT TO CEDAR PLANT	7.25	9.92	Widen highway to four lanes with left turn refuges
EAST OF CEDAR POINT	8.25	9.02	Extend existing westbound passing lane to the west; Construct if widening to four lanes is not to be implemented within 15-20 years

TABLE 6. OR 38/OR 42 CORRIDOR STUDY – ADDITIONAL PASSING LANE IMPROVEMENTS WITH ALTERNATIVE LOCATIONS

LOCATION			BEGIN MP	END MP	DESCRIPTION
WESTBOUND	Alternative A	Brockway passing lane	71.22	70.60	Extend existing lane
		E. of Slater Creek to E. of County line	46.54	45.65	Add passing lane
		Sleepy Hollow east of Bridge	32.00	31.40	Add passing lane
	Alternative B	Big Creek Rd. to King Creek	29.92	29.20	Add passing lane
EASTBOUND	Alternative A	King Creek to Big Creek Rd.	29.20	29.29[a]	Add passing lane
	Alternative B	Sleepy Hollow RV Park	31.40	32.00	Add passing lane
	Alternative C	Small Creek to Belieu Creek	32.95	32.20	Add passing lane
WESTBOUND	Alternative A	Ireland Road to Benedict Road	62.15	63.50	Add passing lane
	Alternative B	Crater Road to Benedict Road	63.10	63.60	Add passing lane

Note: [a] The MP location of 29.29 matches the location summarized in the prior report, however the location of 29.92 is more likely intended and matches the opposite direction.

Figure 3 shows prioritization for passing lane locations as presented in the standards summarized.

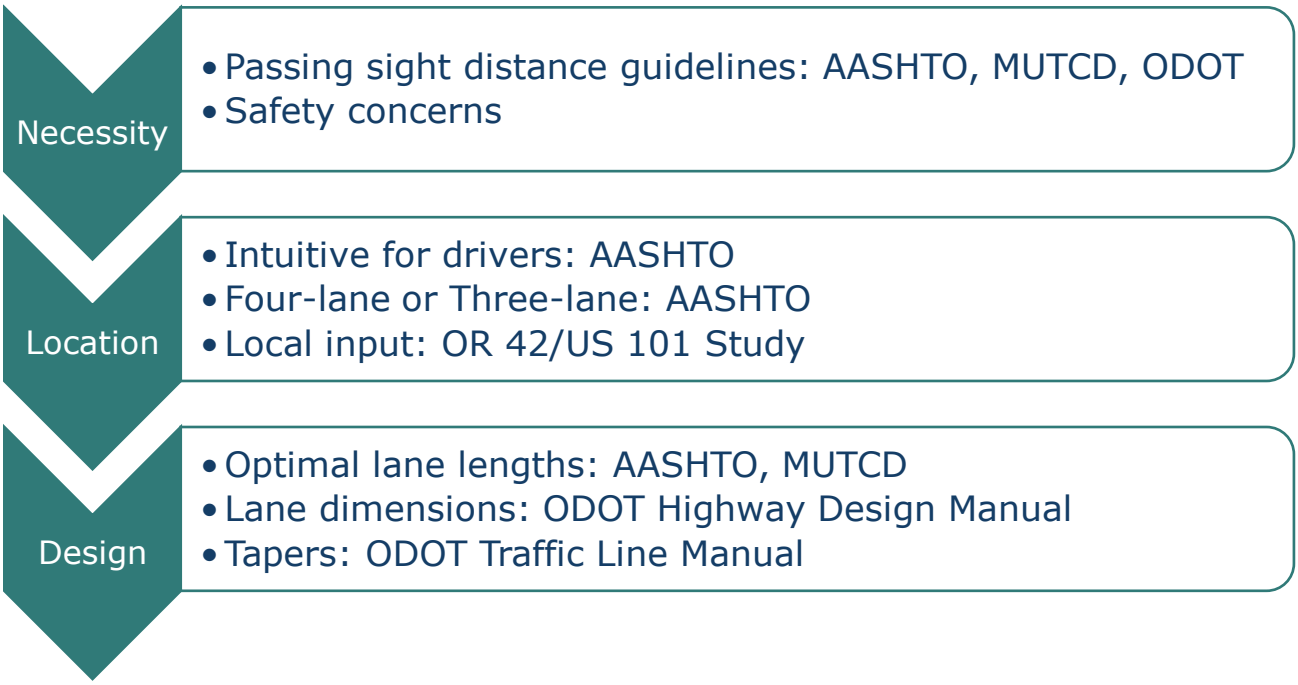
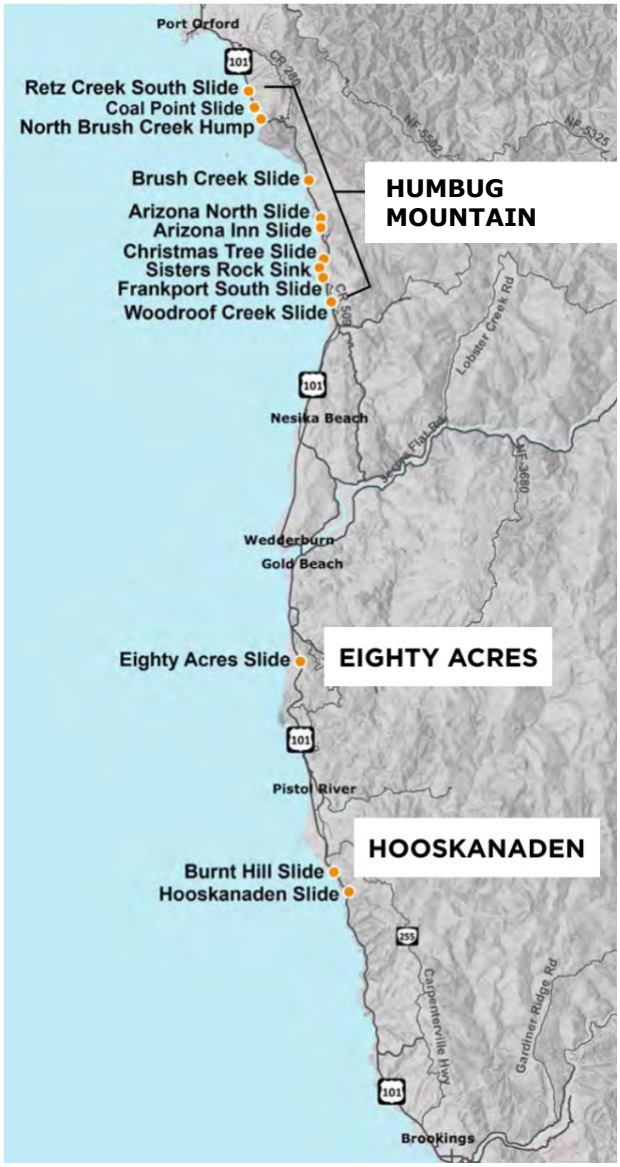


FIGURE 3. PRIORITIZATION OF POTENTIAL PASSING LANE LOCATIONS

The South Coast Slides Study (2023)[9] analyzed historical locations of landslides along US 101 on the Oregon Coast and developed a plan for managing traffic in the event of future slides. The study identified and mapped prior slides that have occurred between Port Orford and Brookings (milepoint 303 to 352). These locations correspond to the following segments that are included in this study:

- 101-F (Port Orford to Gold Beach)
- 101-G (Gold Beach to Brookings)

The landslides were generally grouped into three areas: Humbug Mountain (south of Port Orford), Eighty Acres (between Gold Beach and Pistol River), and Hooskanaden (south of Pistol River). The approximate locations of the slides are shown in the inset figure (right) that is an excerpt from the report. Locations of these historical slides will be considered when developing potential passing lane alternatives.



EXISTING CONDITIONS

This section presents a summary of existing conditions on OR 42 and US 101.

STUDY CORRIDOR

Table 7 provides a summary of the study segments, including each segment's location, number of existing passing lanes, and posted speeds.

[9] https://www.oregon.gov/odot/projects/pages/project-details.aspx?project=22228

TABLE 7. SEGMENT SUMMARY

SEGMENT	NAME	MILEPOINTS	DISTANCE (MILES)	NOTES
101-A	Douglas County Line to Reedsport	MP 198.59-211.07	12.48	• 2 NB passing lanes, 4 SB passing lanes • 55 mph • 35 mph (0.68 mi)/45 mph (0.19 mi) through Gardiner • 40 mph on Umpqua River Bridge (0.10 mi)
101-B	Reedsport to Lakeside	MP 213.45-221.35	7.9	• 3 NB passing lanes, 1 SB passing lane • 55 mph • 45 mph through Winchester Bay (0.34 mi)
101-C	Lakeside to North Bend	MP 222.10-233.93	11.83	• 2 NB passing lanes, 3 SB passing lanes • 55 mph • 45 mph on McCullough Bridge (0.76 mi)
101-D	US101-OR42 Junction to Bandon	MP 245.00-260.63	15.63	• 1 NB passing lane, 3 SB passing lanes • 55 mph
101-E	Bandon to Port Orford	MP 276.71-298.32	21.61	• 6 NB passing lanes, 4 SB passing lanes • 55 mph • 50 mph through Laurel Grove (1.07 mi) • 40 mph through Langlois (0.94 mi)
101-F	Port Orford to Gold Beach	MP 303.30-326.21	22.91	• 3 NB passing lanes, 4 SB passing lanes • 55 mph
101-G	Gold Beach to Brookings	MP 331.29-352.20	20.91	• 4 NB passing lanes, 5 SB passing lanes • 55 mph
101-H	Brookings to CA Border	MP 361.52-363.11	1.59	• No existing passing lanes • 55 mph
42-A	West of Coquille	MP 7.10-9.38	2.28	• 2 WB passing lanes, 1 EB passing lane • 55 mph
42-B	Myrtle Point to OR 542 Junction	MP 22.09-23.44	1.35	• No existing passing lanes • 55 mph
42-C	OR 542 Junction to OR 42 Couplet	MP 23.72-47.75	24.03	• 1 WB passing lane, 1 EB passing lane • 55 mph

The project team compiled information from various GIS databases to create an inventory of existing conditions along the corridor. Detailed maps of each study segment are provided in the Appendix – Section A.

The key characteristics of the study segments are summarized below.

UNSTABLE SLOPES:

- Nine out of 11 segments have risk of fill failure in several locations.
- Seven out of 11 segments have risk of landslides in at least one location. Segments 101-A, 101-B, 101-E, and 101-H do not have risk of landslides.
- Seven out of 11 segments have risk of rockfalls in at least one location. Segments 101-C, 101-D, 101-E, and 101-G do not have risk of rockfalls.
- There is one instance of debris flow risk on segment 42-C near MP 26.3.

STRUCTURES:

- Numerous bridges and culverts are present on every segment.

BIKE AND PEDESTRIAN FACILITIES:

- Sidewalk is limited along the corridor. The only sidewalks present on study segments are extensions of pedestrian facilities in urban areas.
- Similar to sidewalks, bike facilities such as separated bike lanes are limited to urban areas. As is typical of rural highways, bicycles are expected to travel on the road shoulder.

SAFETY:

- Fatal or serious injury crashes are present on every segment. Of 79 total fatal and serious injury crashes, five involved a pedestrian or bicyclist.
  Note: A detailed safety investigation will be performed as part of a later task.

EXISTING PASSING LANES

Table 8 provides a summary of the passing lanes organized per study segments.

TABLE 8. EXISTING PASSING LANES SUMMARY

SEGMENT	# NB/WB PASSING LANES	AVG NB/WB PASSING LANE LENGTH (MILES)	# SB/EB PASSING LANES	AVG SB/EB PASSING LANE LENGTH (MILES)
101-A	2	1.35	4	0.63
101-B	3	0.74	1	1.70
101-C	2	0.59	3	0.66
101-D	1	1.63	3	1.28
101-E	6	0.54	4	0.75
101-F	3	0.92	4	0.53
101-G	4	1.32	5	1.21
42-A	2	2.61	1	5.08
42-C	1	0.44	1	0.50

Note: There are no existing passing lanes on segments 101-H from Brookings to the CA border and 42-B from Myrtle Point to the OR 542 junction.

In total, there are 50 total existing passing lanes. On US 101 segments, there are 21 northbound passing lanes and 24 southbound passing lanes. On OR 42 segments, there are 3 westbound passing lanes and 2 eastbound passing lanes. Existing passing lane locations and directions can be viewed on the maps in Appendix A.

PREVIOUSLY SCOPED PROJECTS

This section describes projects that were previously scoped and programmed for construction but were unable to be built due to funding constraints.

OR 42: MCMULLEN CREEK PASSING LANE & CURVE IMPROVEMENTS

The McMullen Creek Passing Lane & Curve Improvements (MP 28.20-29.90) project was first scoped in October 2012 for the 2016-18 STIP cycle. The project consists of constructing a westbound passing lane as well as cutting back the rock face and straightening the horizontal curve at McMullen Creek Road. The total cost estimate was approximately $16.1 million.

OR 42: PASSING LANES EAST OF BRIDGE

The Passing Lanes East of Bridge (MP 30.90-32.50) project was first scoped in February 2008 for the 2012-13 STIP cycle. The project consists of constructing passing lanes in both directions and reducing curves where possible. Potential risks include eight known archaeological sites along the project corridor, which will require an archaeological survey to determine site boundaries and significance. The total cost estimate was approximately $10.8 million.

OR 42: SLATER CREEK WESTBOUND PASSING LANE

The Slater Creek Westbound Passing Lane (MP 45.90-47.20) project was first scoped in October 2012 for the 2016-18 STIP cycle. The project consists of constructing a 12-foot westbound passing lane with a 2” overlay throughout the entire passing lane section. The total cost estimate was approximately $7.5 million.

US 101: CLEAR LAKE NORTHBOUND PASSING LANE EXTENSION

The Clear Lake Northbound Passing Lane Extension (MP 217.85-217.50) project was first scoped in July 2010 for the 2014-15 STIP cycle. The project consists of lengthening the existing northbound passing lane to the north by 0.35 miles. The total cost estimate was approximately $1.1 million.

US 101: SAUNDERS LAKE SOUTHBOUND PASSING LANE

The Saunders Lake Southbound Passing Lane (MP 226.30-228.40) project was first scoped in February 2008 for the 2012-13 STIP cycle. The project consists of constructing a new southbound passing lane. Potential risks include the Hauser Bog Special Management Area for the endangered Western Lily, located on the east side of US 101 from MP 228.0-228.2. Design and construction must minimize hydrologic impacts to the endangered plants. The total cost estimate was approximately $1.1 million.

APPENDIX

CONTENTS

A. INVENTORY

B. SEGMENT MAPS