

MEMORANDUM

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To: James Feldmann
From: Phill Worth, Bincy Koshy, Polina Polikakhina, and Camilla Dartnell, PE
Project: Highway OR 99W South Corvallis Facility Plan
Subject: TM #15A: Multimodal Alternatives Analysis

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INTRODUCTION

This memorandum documents the analysis of the two long-term project alternatives (Alternative A and Alternative B) that are being considered as options for the OR 99W South Corvallis Facility Plan. Throughout the document, the two project alternatives are evaluated by segment for people walking, people biking, and people riding transit. The memorandum also documents the safety performance of each alternative.

Technical Memorandum 14: Corridor Alternatives (TM #14) provides the alternatives that are being evaluated in this memorandum. As in TM #14, the corridor is subdivided into three segments. Those segments are as follows:

Segment 1: Western Boulevard to SE Crystal Lake Drive

Segment 2 Alternative A (Segment 2A): SE Crystal Lake Drive to SE Goodnight Avenue

Segment 2 Alternative B (Segment 2B): SE Crystal Lake Drive to SE Goodnight Avenue

Segment 3: SE Goodnight Avenue to the Southern Urban Growth Boundary (UGB)

As discussed in TM #14, the solutions for Segment 1 and Segment 3 are the same for both alternatives.

ALTERNATIVES EVALUATION

This section summarizes the results of the multimodal evaluation for the alternatives proposed for the OR 99W South Corvallis Facility Plan.

PEDESTRIAN SYSTEM

The pedestrian system within the project study area currently consists of sidewalks, physical buffers such as curbs, vegetation, trees and grass, and shared-use paths. The alternatives proposed for the OR 99W corridor are intended to enhance the pedestrian system to better serve people walking.

The project team evaluated the pedestrian facilities and Pedestrian Level of Traffic Stress (PLTS) for Alternative A and Alternative B to assess the proposed pedestrian improvements within the project study area. The PLTS score is based on four criteria, including sidewalk condition and width, physical buffer type, total buffering width, and general land use. All four criteria are scored from 1 to 4 and the highest score determines the overall score for the road segment.

Table 1¹ provides a brief overview of the proposed pedestrian facilities and documents the PLTS results for each segment. Figure 1² illustrates the results of the PLTS analysis conducted within the project study area.

¹ The PLTS rating of the abutting streets remain the same as the existing conditions as no improvements are proposed on the abutting streets through this project.

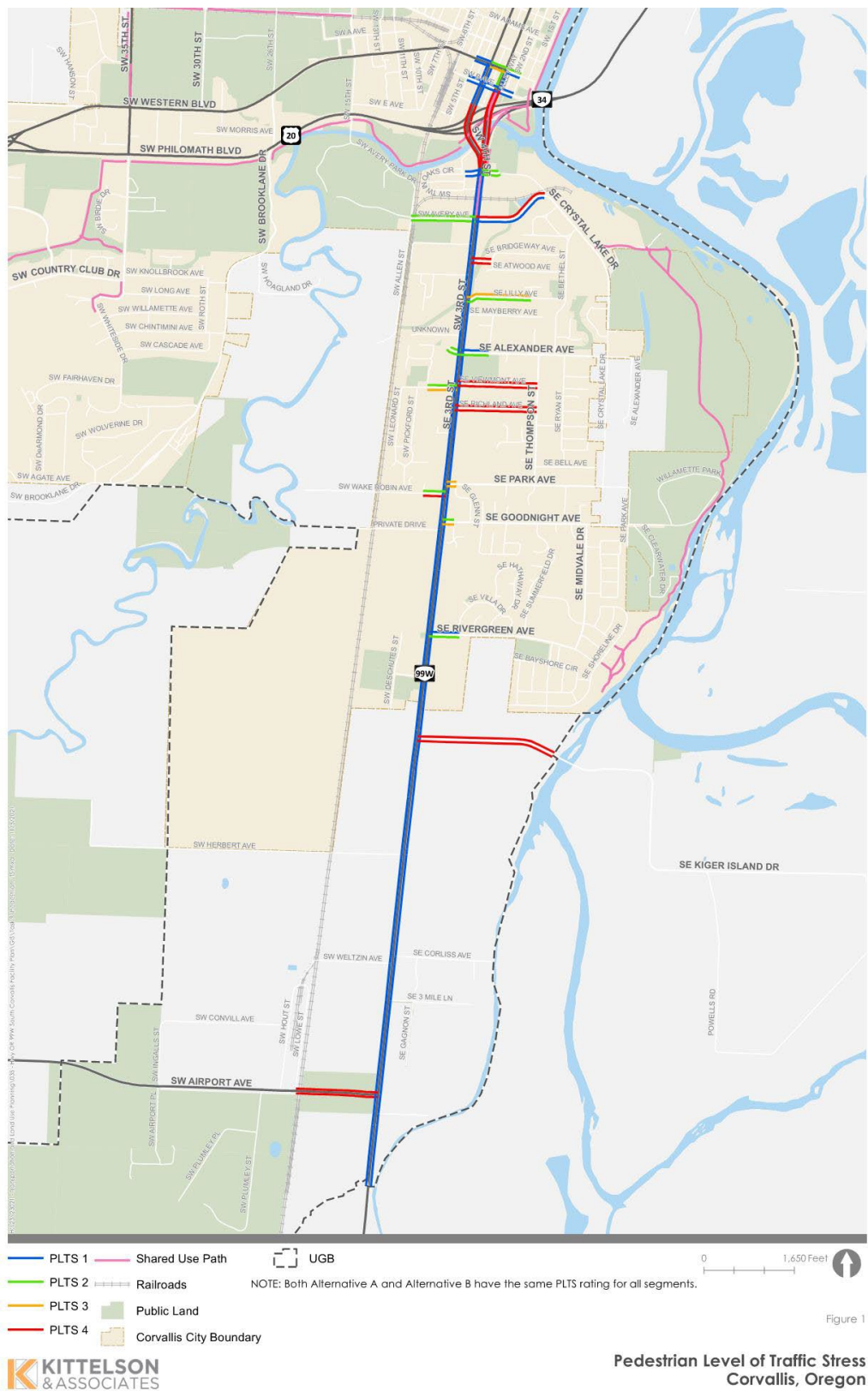
² Segment 2 for Alternative A and Alternative B have the same PLTS rating

Table 1. Pedestrian Facilities and PLTS Evaluation

Segment	Facility Description	PLTS
<p>Segment 1: Western Boulevard to SE Crystal Lake Drive</p>	<ul style="list-style-type: none"> The intersections of OR 99W (SW 3rd Street and SW 4th Street) with SW Western Boulevard are proposed to separate left-turning traffic from pedestrian crossings by adding dedicated left-turn phases to the signals. Crossings are proposed to be added at SW C Avenue on OR 99W northbound; at the intersection of OR 99W southbound with the future OR 34/US 20 westbound ramp terminal signalized south of C Avenue; south of SW Twin Oaks Circle; and at the intersection of SE Crystal Lake Drive/SW Avery Avenue. South of Western Boulevard, OR 99W would be reorganized to be two through travel lanes southbound, providing space for a bidirectional raised shared use path. An actuated crossing would be provided at the ramp entrance for OR-34/US-20 westbound from OR 99W for people walking and biking. For OR 99W southbound, the sidewalk conditions on the east side of the street are fair currently and should be maintained to improve their condition. The sidewalks adjacent to OR 99W northbound and those on the east side of OR 99W southbound should be maintained to improve their condition. Between the recommended new eastbound off-ramp terminal roundabout and the intersection at Avery Avenue-Crystal Lake, OR 99W should be a five-lane cross section with separated 8-foot-wide pedestrian facilities and planted median treatments added to improve pedestrian safety and comfort. 	<p>North of the interchange couplet, the anticipated separated 16-foot-wide bidirectional raised shared-use path provides a PLTS 1 facility for OR 99W southbound, and with maintained sidewalks on the east side of the road, the PLTS for this stretch will also be LTS 1. In the northbound direction, maintained sidewalks and additional trees planted in the buffer on the east side will provide a PLTS 1 facility. The buffer on the west side is narrower, however, and because there are three travel lanes, the PLTS is 2.</p> <p>Along the freeway interchange, the PLTS rating increases to 4, as the interchange land use decreases comfort for people walking.</p> <p>South of the interchange, the PLTS rating would be 1, as a separated 8-foot-wide pedestrian facility is recommended with a 7-foot-wide buffer.</p>
<p>Segment 2 Alternative A: SE Crystal Lake Drive to SE Goodnight Avenue</p>	<ul style="list-style-type: none"> Segment 2A retains a five-lane cross section and adds separated pedestrian facilities. Protected intersection treatments and crossings should be added at the intersections. Crossings along this cross section should include a red device (pedestrian signal or pedestrian hybrid beacon). Crossings would be added at SE Bridgeway Avenue; SE Lilly Avenue; SE Viewmont Avenue; south leg of SE 	<p>Segment 2A will include a separated pedestrian facility buffered from the roadway with planted buffers. Sidewalks should be 8 feet wide with 7-foot-wide buffers. This segment will have a PLTS rating of 1.</p>

	<p>Richland Avenue; SE Park Avenue; and between SE Park Avenue and SE Goodnight Avenue.</p> <ul style="list-style-type: none"> • Crossings located south of SE Mayberry Avenue and at SE Alexander Avenue should be maintained and enhanced. The existing crossing south of SW Tunison Avenue and the existing rapid flashing beacon located north of SE Lilly Avenue should be removed. 	
<p>Segment 2 Alternative B: SE Crystal Lake Drive to SE Goodnight Avenue</p>	<ul style="list-style-type: none"> • Segment 2B changes the existing five-lane roadway to a three-lane cross section with separated pedestrian facilities. • Rectangular rapid flashing beacons can be provided at the pedestrian crossings as the roadway will be narrowed to a three-lane cross section. • The recommended crossing locations along this segment are identical for Alternatives A and B, and major intersections will have roundabouts with pedestrian crossings. 	<p>Segment 2B will include a separated pedestrian facility buffered from the roadway with planted buffers. Sidewalks should be 8 feet wide with 7-foot-wide buffers. This segment will have a PLTS rating of 1.</p>
<p>Segment 3: SE Goodnight Avenue to the Southern UGB</p>	<ul style="list-style-type: none"> • A three-lane cross section with separated pedestrian facilities should be provided in this segment. • Regular crossings should be added to accommodate people walking and biking across the highway. These locations will be selected as development occurs to support the land use patterns and should be spaced no farther than 1,000 ft. Major intersections will have roundabouts with pedestrian crossings. 	<p>The proposed separated pedestrian facilities will improve the rating to 1 PLTS 1, contingent upon speed limits dropping to below 40 miles per hour (MPH). The Oregon Department of Transportation's (ODOT) <i>Blueprint for Urban Design</i> recommends a target speed of 25 MPH to 30 MPH for 'urban mix' land use context (SW Western Boulevard to SE Kiger Island Drive) and 30 MPH to 35 MPH for 'residential corridor' land use context (SE Kiger Island Drive to south project limit). Over time, segment 3 (beyond SE Kiger Island Drive) will be developed into a residential corridor and the speed limit is recommended to drop to 30-35 MPH which will lead to a PLTS rating 1, however, if speeds remain to be above 40 MPH, the PLTS rating will be 2.</p>

Figure 1: Pedestrian Level of Traffic Stress



BICYCLE SYSTEM

The bicycle system within the project study area currently consists of on-street bike lanes, shoulder bikeways, shared roadways, and off-street shared use paths. The alternatives proposed for the OR 99W corridor will enhance the bicycle system to better serve people biking.

The project team evaluated the bicycle facilities and Bicycle Level of Traffic Stress (BLTS) for Alternative A and Alternative B to assess the proposed bicycle improvements within the project study area. The BLTS score is determined based on the speed of the roadway, the number of travel lanes per direction, the presence and width of an on-street bike lane and/or adjacent parking lane.

Table 2³ documents the BLTS analysis and includes a brief overview of the proposed biking facilities for each segment. Figure 2⁴ illustrates the results of the BLTS analysis conducted within the project study area.

³ The BLTS rating of the abutting streets remain the same as the existing conditions (LTS 2 or better) as no improvements are proposed on the abutting streets.

⁴ Segment 2 for Alternative A and Alternative B have the same BLTS rating

Table 2. Bicycle Facilities BLTS Evaluation

Segment	Facility Description	BLTS
Segment 1: Western Boulevard to SE Crystal Lake Drive	<ul style="list-style-type: none"> The intersections of OR 99W (SW 3rd Street and SW 4th Street) with SW Western Boulevard are proposed to be protected and delineated for bicyclists. South of Western Boulevard, OR 99W southbound would be reorganized to be two through travel lanes southbound therefore providing additional space that would be used as a bidirectional raised shared use path. A bidirectional protected bicycle facility would be continued along the west side of OR 99W to the ramp terminal roundabout, and northbound bicyclists would access the path on the west side of OR 99W by crossing at the roundabout. Between the recommended new ramp terminal roundabout and the intersection at Avery Avenue-Crystal Lake, OR 99W would remain as a five-lane cross section and 8 foot wide separated bicycle facilities would be added. 	<p>In the southbound direction, north of the interchange couplet the 16 feet wide bidirectional raised shared use path would lead to BLTS rating 1. South of the interchange terminal roundabout, the BLTS rating would also be 1 as a protected bicycle facility is proposed.</p> <p>In the northbound direction, the BLTS rating along the roadway remains a BLTS 3, as there is no dedicated bike lane. The existing adjacent path on the east side of the road will continue to provide a LTS 1 facility. South of the interchange terminal roundabout, the existing shared use path will continue to provide LTS 1 facilities.</p>
Segment 2 Alternative A: SE Crystal Lake Drive to SE Goodnight Avenue	<ul style="list-style-type: none"> Segment 2 Alternative A retains a five-lane cross section and adds 8 foot wide separated bicycle facilities. Protected intersection treatments and crossings would be added as described in the pedestrian section. 	Separated bicycle facilities with a planted buffer provide a BLTS rating of 1.
Segment 2 Alternative B: SE Crystal Lake Drive to SE Goodnight Avenue	<ul style="list-style-type: none"> Segment 2 Alternative A retains a five-lane cross section and adds 8 foot wide separated bicycle facilities. Intersection treatments and crossings would be added as described in the pedestrian section. 	Separated bicycle facilities with a planted buffer provide a BLTS rating of 1.
Segment 3: SE Goodnight Avenue to the Southern UGB	<ul style="list-style-type: none"> A three-lane cross section with separated bicycle facilities should be provided in this segment. Intersection treatments and crossings would be added as described in the pedestrian section. 	Separated bicycle facilities with a planted buffer provide a BLTS rating of 1.

Legend:

- BLTS 1 (Blue line)
- BLTS 2 (Green line)
- BLTS 3 (Orange line)
- BLTS 4 (Red line)
- Shared Use Path (Pink line)
- UGB (Dashed line)
- Railroads (Black line with cross-ticks)
- Public Land (Green area)
- Corvallis City Boundary (Yellow area)

NOTE: Both Alternative A and Alternative B have the same BLTS rating for all segments

Scale: 0 to 1,650 Feet

Figure

CROSSING LOCATIONS AND SPACING

Based on ODOT's *Blueprint for Urban Design*, target pedestrian crossing spacing is 250-550 feet in urban mix context and 500-1,000 feet in the residential corridor context. Table 3 documents the proposed crossings along the corridor and the average spacing of all crossings proposed and maintained along OR 99W.

TM #14 Memorandum: Alternatives Development provides a detailed overview of existing and proposed crossing for each segment.

Table 3. New Crossing Locations and Average Spacing for Segments

Segment	Crossing Locations
<p>Segment 1: Western Boulevard to SE Crystal Lake Drive</p>	<p>New crossing locations include:</p> <ul style="list-style-type: none"> • Crossing at SW B Avenue on OR 99W northbound and southbound directions • Crossing at SW C Avenue on OR 99W northbound • Crossing at signalized intersection for OR 34/US 20 westbound ramp terminal • Crossing at OR 34/US 20 eastbound ramp terminal roundabout, north of SE Chapman Place • Crossing at southern intersection of SW Twin Oaks Circle <p>Crossings at both the intersection of Western with OR 99W northbound and southbound (SW 4th Street and SW 3rd Street); and at the intersection of SE Crystal Lake Drive/SW Avery Avenue would be maintained and enhanced. The current rectangular rapid flashing beacon crossing just north of the southern intersection of SW Twin Oaks Circle would be removed when it is replaced by the new crossings listed above.</p> <p>The average crossing spacing for this segment would be approximately 611 feet. This crossing spacing does not meet the ODOT Blueprint for Urban Design's target crossing spacing guidance for urban mix segments because the interchange through the segment does not include destinations for which a crossing would need to provide access.</p>

<p>Segment 2 Alternative A and Alternative B: SE Crystal Lake Drive to SE Goodnight Avenue</p>	<p>New crossing locations include:</p> <ul style="list-style-type: none"> • Crossing at SW Hopkins Avenue* • Crossing at SE Bridgeway Avenue • Crossing at SE Lilly Avenue • Crossing mid-block north of SE Alexander Avenue* • Crossing at SW Viewmont Avenue • Crossing at south leg of SE Richland Avenue • Crossing at SE Park Avenue • Crossing between SE Park Avenue and SE Goodnight Avenue (exact location to be determined later in the project depending on future development) • Crossing at SE Goodnight Avenue <p>Crossings located south of SE Mayberry Avenue and at SE Alexander Avenue would be maintained and enhanced. The existing crossing south of SW Tunison Avenue and the existing rapid flashing beacon located north of SE Lilly Avenue would be removed when they are replaced by the new crossings listed above.</p> <p>Average crossing spacing for this segment would be approximately 500 feet, which meets the target crossing spacing guidance for urban mix segments in ODOT Blueprint for Urban Design.</p>
<p>Segment 3: SE Goodnight Avenue to the Southern UGB</p>	<p>Final crossing locations will be established at locations that are expected to generate walking and biking traffic and spacing between the crossings should target less than 550 feet for the segment north of Kiger Island Drive and 1,000 feet for the segment south of Kiger Island Drive.</p>

*These are lower priority crossings that should be added as the corridor develops if more destinations are added in these areas

TRANSIT ANALYSIS

No major changes are anticipated for the transit system along the segments of OR 99W through this plan. Some of the minor changes include:

- All transit stops will be equipped with transit amenities such as lighting, shelter, and benches
- Along Segment 2 Alternative B three-lane cross section, motor vehicle delays may increase as motorists stop behind buses
- Frequency of transit vehicles is not anticipated to change; however, on-time reliability will likely be affected by motor vehicle traffic along the corridor during peak periods
- All transit stops will be connected to sidewalks and bike lanes along OR 99W that have a PLTS rating and BLTS rating of 1.

- Transit stops should be coordinated with proposed crossing locations along all segments of the corridor.

SAFETY

The following section provides potential safety solutions proposed for each of the alternatives introduced in TM #14. Table 4 summarizes proposed improvements by segments. These solutions were identified through the Roadway Safety Audit (RSA), the safety analysis presented in TM #10 and corridor alternative development. Crash reduction factors (CRF) are provided for those solutions for which a relevant CRF exists. Unless otherwise noted, CRFs presented in Table 4 are provided by ODOT.

Table 4: Proposed Safety Improvements

Segment	Specific Location	Proposed Improvements and Countermeasure Number (if applicable)	Potential CRF (if applicable)	Applicable Crash Types
Entire Corridor	Entire segment	Improve segment lighting, especially south of SW Avery Avenue (SE Crystal Lake Drive) and on the east side of the corridor	N/A	
		Improve signage: reduce sign clutter, review signage for correct installation, and adjust and/or enhance signage as needed	N/A	
		Improve signage: position speed limit signs to maximize visibility and retroreflectivity	N/A	
		Improve signage: add wayfinding signs throughout the corridor for people walking and biking	N/A	
		Improve signage: move street name signs closer to the edge of the roadway	N/A	
		Install guide signs (H55)	20%	All
		Install urban green bike lanes at conflict points (PM6)	39%	Bicycle
	All city/local approaches, where possible	Install curb extensions (I33)	30%	All
		Tighten intersection corner curb radii	N/A	

Segment	Specific Location	Proposed Improvements and Countermeasure Number (if applicable)	Potential CRF (if applicable)	Applicable Crash Types
	All signalized intersections	Improve signal hardware: lenses, reflectorized back plates, size, and number (I2)	20-30%	All
		Install bike boxes at conflict points (BP7)	35%	Bicycle
	All crossing locations	Provide intersection lighting (BP2)	42%	Bicycle & pedestrian, night
Segment 1: SW Western Boulevard to SE Crystal Lake Drive	Intersections of OR 99W & SW B Avenue, OR 99W northbound & SW C Avenue, OR 99W & SW Twin Oaks Circle	Install enhanced pedestrian crossings at unsignalized intersections	N/A	
	SW Western Boulevard couplet intersections	Replace permissive left turns to protected only (I9)	99%	Left turning
	SW Western Boulevard & SW 4 th Avenue	Convert SB through-right-turn lane to right-turn only	N/A	
	SW 4 th Avenue, between SW B Avenue and OR 34/US 20 interchange	Install speed feedback sign (RD11)	10%	All
	OR 34/US 20 westbound ramp terminal	Install urban traffic signal (H22)	67%	Angle
		Install urban traffic signal (H23)	-143%	Rear-end
		Provide actuated crossing for pedestrians and bicyclists	N/A	
	Southbound segment from SW Western Boulevard	Provide bi-directional raised shared-use path	N/A	

Segment	Specific Location	Proposed Improvements and Countermeasure Number (if applicable)	Potential CRF (if applicable)	Applicable Crash Types
	through the OR 34/US 20 interchange			
	OR 34/US 20 eastbound off-ramp	Reconstruct the ramp to connect with OR 99W south of the Marys River	N/A	
	New eastbound ramp terminal, south of Mary's River	Install roundabout	N/A	
		Add pedestrian crossing: Install Rectangular Rapid Flashing Beacon (NS22PB) ⁵ Install Pedestrian Hybrid Beacon, PHB (BP19)	35%	55%
	Proposed roundabout to SW Avery Avenue/Crystal Lake Drive	Install separated bicycle and pedestrian facilities	N/A	
		Provide a raised median, urban multi-lane road (H38)	20%	All
		Provide street trees (BP31)	10%	All
Segment 2 Alternative A and Segment 2 Alternative B: SE Crystal Lake Drive to SE Goodnight Avenue	Crossing south of SW Twin Oaks/SE Chapman Place	Remove mid-block crossing	N/A	
	Entire segment	Upgrade bicycle lanes to separated bicycle facility	N/A	
		Provide street trees (BP31)	10%	All
		Provide a raised median, urban multi-lane road (H38)	20%	All
	Intersections of OR 99W with SW Hopkins Avenue, SW Bridgeway Avenue, SE Lilly	Install enhanced pedestrian crossings at unsignalized intersections	N/A	

⁵ Source: Caltrans (2020), *Local Roadway Safety, A Manual for California's Local Road Owners*

Segment	Specific Location	Proposed Improvements and Countermeasure Number (if applicable)	Potential CRF (if applicable)	Applicable Crash Types
	Avenue, south leg of SE Richland Avenue, SE Viewmont Avenue, SE Park Avenue			
	Crossings north of SE Lilly Avenue, south of SW Tunison Avenue	Remove RRFB	N/A	
	From SE Mayberry Avenue to Alexander Avenue	Add pedestrian crossing: Install Rectangular Rapid Flashing Beacon (NS22PB) ⁵ Install Pedestrian Hybrid Beacon, PHB (BP19)	35% 55%	
	Near SE Alexander Avenue (northbound and southbound)	Install speed feedback sign (RD11)	10%	
	From SE Park Avenue to SE Goodnight Avenue	Add pedestrian crossing: Install Rectangular Rapid Flashing Beacon (NS22PB) ⁵ Install Pedestrian Hybrid Beacon, PHB (BP19)	35% 55%	
Segment 2A: SE Crystal Lake Drive to SE Goodnight Avenue	Signalized intersections of OR 99W with SE Lilly Avenue, SE Park Avenue	Install urban traffic signal (H22)	67%	Angle
		Install urban traffic signal (H23)	-143%	Rear-end
Segment 2B: SE Crystal Lake Drive to SE Goodnight Avenue	Entire segment	Reduce number of lanes from 5 to 3	N/A	
	Entire segment	Upgrade bicycle lanes to separated bicycle facility	N/A	
		Provide street trees (BP31)	10%	All

Segment	Specific Location	Proposed Improvements and Countermeasure Number (if applicable)	Potential CRF (if applicable)	Applicable Crash Types
		Provide a raised median, urban multi-lane road (H38)	20%	All
	Intersections of OR 99W with SW Avery Street/Crystal Lake Drive, SE Alexander Avenue	Install roundabout from signalized intersection (H19)	78%	All
	Intersections of OR 99W with SE Lilly Avenue, SE Park Avenue	Install roundabout from minor road stop control (H18)	82%	All
Segment 3: SE Goodnight Avenue to the Southern UGB	From SE Goodnight Avenue to SE Kiger Island Drive	Reduce number of lanes from 5 to 3	N/A	
	From SE Rivergreen Avenue to southern UGB	Install lighting on a roadway segment (H30)	28%	Night, all
	Intersections of OR 99W with Goodnight Avenue, Rivergreen Avenue, Kiger Island Drive, Weltzin Avenue/Colliss Avenue, Airport Road	Install roundabout from minor road stop control (H18)	82%	All
	Near Airport Road, northbound	Install speed feedback sign (RD11)	10%	All

CONCLUSION AND NEXT STEPS

The proposed alternatives reduce the level of traffic stress for people biking and walking along OR 99W, and are expected to improve safety outcomes along the corridor. In Technical Memorandum # 16, the project team will evaluate the presented alternatives and develop associated costs estimates. The findings from the evaluation process will help identify the final recommended corridor alternative for OR 99W.

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