

MEMORANDUM

Date: February 18, 2021 Project #: 23021.35
To: James Feldman
From: Nick Gross, Camilla Dartnell, Phill Worth
Project: Highway OR 99W South Corvallis Facility Plan
Subject: TM #7B: Analysis Methodology and Assumptions for Safety and Multimodal Analysis

PURPOSE

This memorandum documents the safety and multimodal analysis methodologies and assumptions for the Highway OR 99W South Corvallis Facility Plan (Plan). The methodologies and assumptions will rely primarily on the Oregon Department of Transportation (ODOT) Analysis Procedures Manual (APM – Reference 1) to evaluate the existing and future multimodal conditions within the project study area.

The methodologies and assumptions identified in this memorandum focus on pedestrian and bicycle multimodal analyses, consistent with the corridor vision (Reference 2):

“Oregon 99W contributes to the sense of place and community identity desired by residents, business and property owners, and visitors to the South Corvallis area. People of all ages and abilities find facilities and amenities along the corridor that safely support and comfortably encourage walking, biking, and the use of transit. A mix of business and civic uses attract and serve adjoining neighborhoods, as well the broader community. The size, mix, and speed of transportation facilities are well-suited to the adjacent land uses and character of each corridor segment. Travel speeds are managed and crossing treatments are provided such that motorists contribute to the sense of vitality, while not detracting from the safety or comfort of vulnerable users. Freight and other through travelers recognize the character of the area and adapt their behaviors and expectations accordingly.”

ODOT Policy Data Analysis Division

ODOT’s Policy Data Analysis Division (PDAD) has prepared, with ODOT Region Traffic review/approval and PMT approval, a final TM #7A: Analysis Methodology and Assumptions memorandum for motor vehicle. This memorandum documents the agreed upon motor vehicle operational analysis methods and assumptions for existing conditions, future conditions, and alternatives analysis. ODOT PDAD has delivered TM #7A to the PMT via BaseCamp.

PROJECT STUDY AREA

The Plan study area covers a 3.9-mile segment of OR 99W between SW Western Boulevard (mile point [MP] 83.93) and the City of Corvallis southern urban growth boundary (UGB) (MP 87.85). The following study intersections will be analyzed as part of the safety and pedestrian and bicycle analysis.

1. SW 4th Street/SW Western Boulevard
2. SW 3rd Street/SW Western Boulevard
3. SW 3rd Street/SW B Avenue
4. OR99W/SW Twin Oaks Circle/SE Chapman Place
5. OR99W/SW Avery Avenue/Crystal Lake Drive
6. OR99W/SE Alexander Avenue
7. OR99W/Viewmont Avenue
8. OR99W/Tunison Avenue
9. OR99W/Park Avenue
10. OR99W/Goodnight Avenue
11. OR99W/Rivergreen Avenue
12. OR99W/Kiger Island Road
13. OR99W/SW Airport Avenue

The project study area for the safety and pedestrian and bicycle analysis also includes 15 public street segments that intersection the highway. Based on data provided by ODOT PDAD , Agency, City, and County, these public street segments include:

- SW Western Boulevard
- SW B Avenue
- SW Twin Oaks Circle
- SE Chapman Place
- SW Avery Avenue
- Crystal Lake Drive
- SE Bridgeway Avenue
- SE Lilly Avenue
- SE Alexander Avenue
- SE Viewmont Avenue
- SW Tunison Avenue
- SE Richland Avenue
- SE Park Avenue
- SW Wake Robin Avenue
- Goodnight Avenue (SE and SW)
- SE Rivergreen Avenue
- SE Kiger Island Drive
- SW Airport Avenue

Figure 1 illustrates the study area extents of OR 99W, study area intersections, and study area public street segments intersecting the highway.



- Project Extents
- Study Area Public Streets
- Project Study Intersections
- Railroads
- Public Land
- Corvallis City Boundary
- UGB



Figure 1

SAFETY ANALYSIS

The safety analysis will include reviewing historical crash data, Safety Priority Index System (SPIS) locations identified on ODOT's TransGIS website, and segments of high risk for pedestrians and bicycles as identified in the Oregon Statewide Pedestrian and Bicycle Safety Plan (Reference 3), within the OR 99W study area.

Crash Analysis

The crash analysis will include an inventory and identification of crash patterns along OR 99W among all users (e.g., trucks, autos, pedestrians, and bicyclists). Crash data will be obtained from ODOT's Online Crash Data system for the most recent 5-years of fully QC'd crash data, 2014-2018. The inventory will focus on OR 99W between SW Western Boulevard and the southern Corvallis urban growth boundary (between milepost 83.93 and 87.85). The inventory will include the following:

- Location;
- Crash type, collision type and characteristics;
- Severity (property damage, injury, or fatality);
- Year, month, weekday, and time;
- Weather and light conditions;
- Alcohol or drug use and speed tagging;
- Summary review of pedestrian/bicycle and truck-involved crashes; and
- Summary review of fatal crashes.

Consultant will review preliminary 2019 and 2020 data for injury "A" (serious injury) and fatal crashes that ODOT is able to provide. Consultant will calculate study intersection crash rates for intersections where ODOT PDAD collected traffic counts and compare with Highway Safety Manual Part B critical crash rates and published 90% percentile rates in Exhibit 4-1 of the Agency's APM.

ODOT PDAD will develop project study area K-factors¹ from available historic counts acquired between 2014 – 2018 for the Plan to convert short duration counts to daily traffic approach volumes. Consultant will calculate the overall crash rate and the fatal/severe injury crash rate of study segments and compare to Table II and Table V, respectively, in the statewide Crash Rate Book to identify study segments with more crashes than other similar facilities in Oregon.

For locations along OR 99W within the study corridor that exceed the critical crash rate, 90th percentile rate, or the Table II/V rate (up to 5), the Consultant will identify and present crash patterns and potential

¹ K-factors are used for converting average annual daily traffic (AADT) to design hour volumes (DHV) as identified on page 5-39 in the ODOT APM: https://www.oregon.gov/odot/Planning/Documents/APMv2_Ch5.pdf

countermeasures/safety improvements at intersections that exceed the statewide crash rate performance threshold. Findings from the consultant team road safety audit (RSA) will be used to verify potential countermeasures and safety improvements due to the most recent available 2014 to 2018 crash data. Identified potential countermeasures will be taken from the All Roads Transportation Safety (ARTS) Crash Reduction Factors (CRF) listing. The consultant will perform a risk assessment of safety issues that arise and suggest low cost and high-cost mitigation options.

Safety Priority Index System

The ODOT Statewide Priority Index System (SPIS) identifies sites along state highways where safety issues warrant further investigation. The SPIS is a network screen developed by ODOT for identifying locations on state highways through consideration of crash frequency, crash rate, and crash severity. Sites identified within the Top 5% and Top 10% are investigated by ODOT staff and reported to the Federal Highway Administration (FHWA). Consultant's data for State highways will include locations of Top 5% and 10% SPIS sites for the three most recent SPIS cycles. SPIS data and locations will be obtained through ODOT's TransGIS website.

PEDESTRIAN AND BICYCLE NETWORK ANALYSIS

Consultant will review the existing pedestrian and bicycle facility network to identify gaps and deficiencies in the project study area (within the highway right-of-way). Consultant will supplement pedestrian and bicycle facility data provided by Agency, City, and County based on site visit, field observations, satellite imagery, and map existing facilities, gaps, and deficiencies as described below.

A gap will be defined as a missing link in the network, including a walking or biking route with a missing sidewalk or bicycle facility. A deficiency will be defined as a pedestrian or bicycle facility that exists but does not meet the standard or is insufficient to meet the users' needs. Examples of deficiencies include, but are not limited to:

- On-street connection that has a Bicycle Level of Traffic Stress rating greater than 2².
- On-street connection that has a Pedestrian Level of Traffic Stress rating greater than 2¹.
- A bike lane or sidewalk with a width <6 feet

² According to the ODOT APM, LTS 1 is a desirable target within ¼ mile of schools, since it is targeted for all users, including children 10 years or younger. As a result, segments that do not achieve LTS 1 within ¼ mile of schools will be identified as a deficiency 1. This includes segments of OR 99W (approximately 300 feet north of SE Lilly Avenue to approximately 325 feet south of SW Prairie Avenue due to the presence of Lincoln Elementary School.

Level of Traffic Stress

Pedestrian Level of Traffic Stress (PLTS) and Bicycle Level of Traffic Stress (BLTS) segment analysis will be performed within project study area (within the highway right-of-way) and along the 18 public streets intersecting the highway, as described in the project study area section on page 2.

The analysis will be conducted in accordance with the procedures outlined in the ODOT APM. The target BLTS to maximize bicycle mode share is BLTS 2 as this level most closely appeals to most of the potential bicycle riding population. The PLTS generally acceptable for most users is PLTS 2.

Active Transportation Facility Standards

Oregon Department of Transportation Highway Design Manual

The Oregon Department of Transportation (ODOT) Highway Design Manual (HDM – Reference 4) Appendix L contains the 2011 ODOT Bicycle and Pedestrian Design Guide and will be used by the consultant to determine the standard for pedestrian and bicycle facility designs. The Bicycle and Pedestrian Design Guide outlines design standards including minimum widths for pedestrian and bicycle facilities.

Oregon Department of Transportation Blueprint for Urban Design

The ODOT Blueprint for Urban Design (BUD – Reference 5) is an interim update to the ODOT HDM and provides a decision-making framework and guidance for multimodal facility selection based on the adjacent contextual characteristics of state highway facilities.

As stated in the BUD, “where design guidance and criteria in the 2012 Highway Design Manual or other ODOT manuals do not align with the design criteria within the Blueprint for Urban Design, the Blueprint for Urban Design shall be the governing guidance and criteria until such time that all other manuals are updated to include the content found in the Blueprint for Urban Design.”

Pedestrian Facilities

The consultant will rely on the guidance provided in the ODOT HDM and BUD to identify the appropriate selection for pedestrian facilities based on the established urban context.

Bicycle Facilities

Similarly, the consultant will rely on the guidance provided in the ODOT HDM and BUD to identify the appropriate selection for bicycle facilities based on the established urban context.

Urban Design Context

The BUD identifies six potential urban contexts to select from when planning for corridor projects: Urban Mix, Traditional Downtown/Central Business District (CBD), Commercial Corridor, Residential Corridor, Suburban Fringe, and Rural Community. The consultant team will work with Agency to identify the urban design context(s) throughout the OR 99W corridor within the project study area and provide documentation as part of the Urban Design Concurrence Document (See Task 8.4). The selected urban context(s) must align and be consistent with the identified Corridor Vision, Guiding Principles, Goals, and Desired Outcomes, and Evaluation Criteria and Performance Measures.

Guidance on cross section elements for potential solutions, including pedestrian and bicycle facility dimensions, will rely on the recommendations outlined in the BUD, based on the identified urban context.

TRANSIT ANALYSIS

The transit analysis will include four quality of service measures for transit users within the OR 99W study area. To determine the service measures to be considered, ODOT's APM and the City of Corvallis' Transit Development Plan (TDP) were reviewed. The following four quality of service measures will be used and are supported with available data:

Transit Stop Amenities (Percentage of transit stops with shelters, benches, lighting, and maneuvering areas)

Based on procedures outlined in the ODOT APM, transit stops that are equipped with shelters, benches and lighting will rate higher than stops with no amenities. This will serve as the target level for this service measure (presence of amenities). Highly rated stops should have boarding and maneuvering areas as well. Rational for this target is that transit stop amenities increase rider comfort while riders wait for the bus and hence has a direct impact on ridership.

Frequency and On-Time Reliability of Transit Routes

More frequent service and higher on-time schedule reliability is preferred compared to less frequent and less reliable transit service. Based on the Corvallis Transit System Route 6, the service level standards for frequency are currently 30 minutes for most of the day and 20 minutes during peak times. Based on the service level standards for reliability, expected system-wide on-time performance (departing within four minutes of schedule) is 85%. This will serve as the target level for the measure.

Connecting Pedestrian/Bicycle Network (Number of transit stops connected to pedestrian and bicycle routes with an LTS of 2 or lower)

Transit stops connected to pedestrian and bicycle routes with a lower LTS will enhance last mile connectivity and overall accessibility of transit routes. The target level of traffic stress for the bicycle and pedestrian routes connected to transit stops is an LTS 2 as this target will generally be acceptable and

appealing to majority of the users. Within a ¼ mile of schools, the LTS target is LTS 1. Transit stops should be relocated to be closer to intersections and neighborhoods connected to pedestrian and bicycle routes.

Average Stop Spacing

In a transit network, the distance between stops affects schedule adherence. Based on review of the City of Corvallis Transit Development Plan, the standard for average stop spacing is 0.25 miles in commercial districts, neighborhoods, and all other areas. This will serve as the target level for the average stop spacing service measure.

POINT-SPECIFIC BARRIERS

Consultant will identify point-specific barriers based on a combination of the safety analysis and pedestrian and bicycle network analysis. Point-specific barriers may include but are not limited to, system gaps, intersections, infrastructure, and natural features.

System Gaps

As described previously, the consultant will perform an active transportation analysis inventorying the existing pedestrian and bicycle facility network within the project study area and identifying gaps and deficiencies, as well as facilities that do not meet standard. These facilities will be identified as system gap barriers.

Intersections

ODOT's OR 99W Curb Ramp Project – SE Chapman Place to SW McKenzie Ave project is slated for construction in 2021. The consultant team will identify intersection barriers based on intersections lacking ADA ramps or equipped with ADA ramps that do not meet standards (as identified by ODOT, the City of Corvallis, or the County). Planned and pending improvements as part of the OR 99W Curb Ramp Project will be considered and locations for ADA ramp upgrades will not be included as barriers. Consultant will also identify intersections exceeding critical crash rate, 90th percentile rate, or the Table II/V rate as barriers.

Infrastructure

Consultant will identify infrastructure barriers based on a qualitative assessment, not to include pedestrian and bicycle facilities. Infrastructure barriers may include but are not limited to the OR 99W/US 20 interchange and the SW 3rd Street and SW 4th Street bridges over Marys River.

Natural Features

Consultant will identify natural features based on a qualitative assessment, not to include human built infrastructure. Examples of natural feature barriers may include steeply sloped areas, flood hazard areas, and riparian corridors and wetlands (such as the Marys River and Mill Race).

Other

Opportunities for Technical Advisory Committee (TAC), Stakeholder Advisory Group (SAG), and the general public to provide input on perceived barriers will also be available through the project process.

NEXT STEPS

TM #7B: Analysis Methodology and Assumptions for Safety and Multimodal Analysis was submitted to the PMT and ODOT PDAD for review and comment. The consultant has updated TM #7B: Analysis Methodology and Assumptions for Safety and Multimodal Analysis based on comments received to develop the Final TM #7B: Analysis Methodology and Assumptions for Safety and Multimodal Analysis used as part of TM#10: Existing Safety and Active Transportation Inventory and Conditions.

REFERENCES

1. Oregon Department of Transportation, Analysis Procedures Manual
2. Draft Corridor Vision
3. Oregon Statewide Pedestrian and Bicycle Safety Plan
4. Oregon Department of Transportation, Highway Design Manual
5. Oregon Department of Transportation, Blueprint for Urban Design