

## TECHNICAL MEMORANDUM

### Woodburn Sub Area Plan

Analysis Methodology and Assumptions Memorandum (Subtask 2.1)

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Date: November 13, 2023 Project #: 29264  
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This memorandum summarizes the methodology and assumptions of the Woodburn Sub Area Plan, as a supplement of the Woodburn Transportation System Plan (TSP). The methodology and assumptions presented in this memorandum are based on Oregon Department of Transportation (ODOT) Analysis Procedures Manual (APM, Versions 1 and 2) and guidance provided by the City of Woodburn staff.

This information will serve as a baseline for identifying the needs and deficiencies to address in the Sub Area Plan. It will also be used to identify and evaluate potential solutions and develop a list of improvements.

## STUDY INTERSECTIONS AND STUDY SEGMENTS

The study intersections were identified by the City prior to development of the scope of work. There are 13 study intersections located along City, County, and ODOT facilities, including four signalized intersections, eight stop-controlled intersections, and one roundabout. Traffic counts were collected at the OR 219 intersections in 2021 for the Project Basie (Amazon Distribution Center) TIA and 2022 for the Chick-Fil-A TIA (References 1 and 2). Updated turning moving counts on Evergreen Road and Parr Road were collected on September 19, 2023. The list of study intersections and corresponding peak hour information is summarized in **Table 1**. 24-hour tube counts were also collected on September 19, 2023 on Parr Road between Butteville Road and Stubb Road.

**Table 1.** Study Intersections

Map ID	Intersection	Count Date	Count Type	Seasonal Adjustment Factor
1	OR 219/Butteville Road*	May 25, 2021	Weekday PM Peak Hour	1.13*
2	OR 219/Woodland Avenue**	September 8, 2022	Weekday PM Peak Hour	1.07**
3	OR 219/I-5 SB Ramps**	September 8, 2022	Weekday PM Peak Hour	1.07**

4	OR 219/I-5 NB Ramps**	September 8, 2022	Weekday PM Peak Hour	1.07**
5	OR 214/Evergreen Road**	September 8, 2022	Weekday PM Peak Hour	1.07**
6	Evergreen Road/Stacy Allison Way	September 19, 2023	Weekday PM Peak Hour	N/A
7	Evergreen Road/Hayes Street	September 19, 2023	Weekday PM Peak Hour	N/A
8u	Killian Spring Drive/Hayes Street	September 19, 2023	Weekday PM Peak Hour	N/A
9	Evergreen Road/Harvard Drive	September 19, 2023	Weekday PM Peak Hour	N/A
10	Parr Road/Settlemier Avenue	September 19, 2023	Weekday PM Peak Hour	N/A
11	Parr Road/Kirksey Street	September 19, 2023	Weekday PM Peak Hour	N/A
12	Parr Road/Stubb Road	September 19, 2023	Weekday PM Peak Hour	N/A
13	Parr Road/Butteville Road	September 19, 2023	Weekday PM Peak Hour	N/A

\* Abstracted from Project Basie (Amazon Distribution Center) TIA

\*\*Abstracted from Chick-Fil-A TIA

## Peak Hour Development

The traffic counts will be reviewed to determine individual and system-wide peak hours for the operational analyses. The system-wide peak hour for the study intersections will be used to conduct the operational analysis of the overall peak period on the Woodburn roadway system.

## Seasonal Factors

Seasonal adjustments will be applied to the counts on ODOT facilities (OR 219 and I-5 terminals) utilizing the seasonal factors developed as part of the Amazon Distribution Center (Project Basie) TIA and Chick-Fil-A TIA.

## Historical Factors

Historical factors were not developed for the traffic counts used from the Project Basie and Chick-Fil-A TIAs because they were collected within the last two years. It is assumed that these counts are still representative of current conditions after balancing to nearby 2023 traffic counts.

## Forecast Traffic Volumes

Future traffic volumes at the study intersections will be developed using the National Cooperative Highway Research Program (NCHRP) Report 255: *Highway Traffic Data for Urbanized Area Project Planning and Design*. The methodology combines the year 2023 30 HV traffic volumes developed at the study intersections with base year and future year 2040 traffic volume forecasts from the current

Woodburn travel demand model developed by ODOT's Transportation Planning and Analysis Unit (TPAU).

## In Process Projects

In addition to forecasted traffic volumes, several in-process projects within the study area are expected to contribute to traffic volumes moving forward. The following in-process developments were identified and will be integrated into existing traffic volumes to develop a new baseline 2023 volume:

- Project Basie (Amazon Distribution Center)
- Chick-Fil-A
- Allison Way Apartments
- Specht Industrial Complex
- Smith Creek Development – *Reviewed but not integrated into the existing volume development*

### ***Project Basie (Amazon Distribution Center)***

The Amazon Distribution Center is located along Butteville Road south of OR 219 and will open in 2024. It was estimated to generate 3,959 trips in the weekday PM peak hour. These trips will be added to the traffic counts collected on September 19, 2023, to encompass the increased volumes expected in the near term.

### ***Chick-Fil-A***

Chick-Fil-A will be in the southeast corner of the Woodland Avenue/OR 219 intersection and is expected to open in 2024. It was estimated to generate 71 new trips during the weekday PM peak hour. These trips will be added as additional volume to the existing traffic counts collected on September 19, 2023, to encompass the increased volumes expected in the near term.

### ***Allison Way Apartments***

The Allison Way Apartments are located east of I-5, north of Parr Road, and west of Evergreen Road. The 586-unit apartment complex was expected to be built in two two-year phases beginning in 2020. Overall, the apartment complex is estimated to generate 157 trips in the weekday PM peak hour. It is assumed the first construction phase consisted of 180-units and was completed at the time of traffic count collection, and the proportional number of trips were encompassed in the existing traffic counts. The remaining trips will be added to the existing traffic counts to represent the near term traffic volumes.

### Specht Industrial Complex

The industrial development on Parr Road east of I-5 is expected to be completed in two phases: Phase 1 in 2025 and Phase 2 at an unknown time. The first phase is estimated to generate 128 trips in the weekday PM peak hour. These trips will be added as additional volume to the existing traffic counts collected on September 19, 2023, to encompass the increased volumes expected in the near term.

### Smith Creek Development

The Smith Creek Development is located north of Parr Road between Stubb Road and Kirksey Street. It was considered partially occupied at the time of September 19, 2023. As of June 2023, a total of 493 units were occupied (120 multi-family units and 373 single-family units). The trips estimated to be generated from this level of occupancy are assumed to be encompassed in the existing traffic counts. Therefore, the estimated trips from this development will not be integrated into the existing volume development.

### Intersection Operational Standards

The study network includes ODOT, Marion County, and City of Woodburn owned facilities. The ODOT facilities include intersection along OR 219 and I-5. ODOT relies on volume-to-capacity (v/c) ratio to assess the operations of an intersection. Table 6 of the *Oregon Highway Plan* (OHP, Reference 3) and Table 10-2 of the *Oregon Highway Design Manual* (HDM, Reference 4) provide maximum V/C ratios for all signalized and unsignalized intersections outside the Portland metropolitan area Urban Growth Boundary (UGB). The OHP ratios are used to evaluate existing and future no-build conditions, while the HDM ratios are used in the creation of future TSP alternatives which involve projects along state highways. **Table 2** summarizes the ODOT standards for the facilities being analyzed in the Woodburn Sub Area plan.

**Table 2. ODOT Operational Standards**

Roadway	Posted Speed > 35 MPH	State Classification System	National Highway System	National Network (Truck Route)	OHP Freight Route	OHP Mobility Targets	HDM Standard
OR 219 (Hillsboro-Silverton Highway 140)	No/Yes <sup>1</sup>	District	Yes/No <sup>2</sup>	No	No	0.95/0.90 <sup>1</sup>	0.75/0.80 <sup>2</sup>
I-5 Ramp Terminals (Pacific Highway 001)	Yes <sup>3</sup>	Interstate Highway	Yes	Yes	Yes	0.85	0.70

<sup>1</sup> The posted speed limit on OR 219 transitions from 35 MPH east of Willow Avenue to 55 MPH west of Willow Avenue. Therefore, the study intersection of Butteville Road/OR 219 has a different set of OHP mobility standards as compared to all other study intersections along OR 219.

<sup>2</sup> OR 219 transitions to part of the National Highway System east of Woodland Avenue. Therefore, the study intersections of Butteville Road/OR 219 and OR 219/Woodland Avenue have a different set of HDM standards as compared to all other study intersections along OR 219.

<sup>3</sup> The non-freeway speed limits adjacent to the ramp terminals are less than 45 MPH.

Marion County used the following mobility standards, as presented in the current Marion County Rural TSP 2005 Update:

- LOS D or better with a V/C ratio of 0.85 or better for signalized, all-way stop, and roundabout intersections.
- LOS E or better with a v/c ratio of 0.90 or better for other unsignalized intersections.
- LOS D or better with a v/c ratio of 0.60 or better for road segments.

The City of Woodburn uses the following mobility standards, as presented in the Woodburn TSP.

- Level of Service (LOS) "E" for signalized intersections
- V/C ratio less than 1.00 regardless of LOS
- V/C ratio of less than 0.90 on the critical movement should be maintained, provided the queues on the critical approach can be appropriately accommodated.

## ANALYSIS MODEL PARAMETERS

The bullets below identify the proposed sources of data and methodologies to be used to analyze traffic conditions in Woodburn. Analyses of the study area and intersections will be conducted according to the most-recent version of the APM.

1. Intersection/Roadway Geometry (lane numbers and arrangements, cross-section elements, signal phasing, etc.) will be verified for consistency with previous work efforts, reviewed through aerial photography, and confirmed through a site visit. Available as-built data may also be used to verify existing roadway geometry. The analysis models will be built on scaled roadway line work from GIS or aerial photography. ODOT's two-way stop-controlled intersection calculator tool will be used to calculate expected queue lengths for two-way stop-controlled intersections.
2. Operational Data (such as posted speeds, intersection control, parking, right-turn on red, etc.) will be field verified. Data will be reviewed during a site visit and supplemented by available GIS data, aerials, and photos.
3. Peak Hour Factors (PHF) will be calculated for each intersection and applied to the existing conditions analyses. PHFs of 0.95 will be used for the future analysis for high-order facilities (arterials), with 0.90 applied to medium-order facilities (collectors) and 0.85 applied to local roads. If the existing PHF is greater than these default future values, the existing PHF will be applied.
4. Traffic Operations
  - a. The Highway Capacity Manual 6<sup>th</sup> Edition (HCM 6<sup>th</sup> Edition) methodology will be used to analyze traffic operations at the signalized intersections while the HCM 6<sup>th</sup> Edition methodology will be used to analyze traffic operations at the unsignalized intersections.
  - b. The existing and future no-build traffic operations analyses will use Synchro 11 software using HCM 6<sup>th</sup> Edition reports for signalized and unsignalized intersections. Electronic Synchro 11 files shall be provided to ODOT for review.

- c. Queuing analysis methodology will be based on Synchro 95<sup>th</sup> percentile queue lengths. Microsimulation is not proposed as part of this long-range planning effort.

## SAFETY ANALYSES

Safety analyses will include reviewing historical crash data and examining roadway crossings, as described in the following sections.

### *Crash Analyses*

The most recent five years of crash data will be reviewed at the study intersections and roadway segments identified through this planning process. The data will be analyzed for a variety of factors including type, severity, general conditions, and location to identify potential crash patterns or anomalies. Particular attention will be paid to the details of crashes involving pedestrians and bicyclists.

Study intersection crash rates and critical crash rates will be calculated based on the method outlined in Part B of the Highway Safety Manual. If a critical crash rate cannot be calculated due to limited data, the published 90th percentile rates in Exhibit 4-1 of ODOT's APM will be used for comparisons purposes. Project-area K-factors from 12+ hour counts will be used to convert short duration counts to daily traffic approach volumes.

For all areas that exceed the critical crash rate or 90th percentile rate, we will identify and present crash patterns and potential projects, policies, or studies that could address reported crash types and patterns. Countermeasures suggested for mitigation will be identified as having crash reduction potential based on Crash Modification Factors from the Highway Safety Manual or FHWA's online Crash Modification Factor (CMF) Clearinghouse with a star rating of 3 or better. All CMFs must have consistent volumes/parameters as the study intersections.