

Tillamook: US 101/OR 6 Alternatives Study Methods and Assumptions Memorandum

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This memorandum outlines the traffic analysis and evaluation framework that will be used in the Tillamook: US 101/OR 6 Alternatives study. Its intent is to state the key assumptions and methodologies that will be used as part of the study’s traffic analysis. The analysis years, study area limits, travel demand forecasting and modeling methodologies, safety analysis methods, and operational parameters will all be discussed in this memo.

To meet project schedule, please submit comments to Norm Rauscher by October 24, 2008.

I. Analysis Years & Time Periods

Transportation analysis will be conducted for the following years:

- Existing Year (2008)
- Design Year (2030)

The traffic analysis will be conducted for the 30th highest hour volume. An overall study area peak hour will be determined by 16-hour intersection turning movement counts that will be collected as part of the study.

II. Traffic Study Area Limits

The traffic study area of the Tillamook: US 101/OR 6 Alternatives study includes roadways that are the jurisdiction of two different agencies: the City of Tillamook and the Oregon Department of Transportation (ODOT). The study area includes US 101 and OR 6 as shown in Table 1.

TABLE 1
 Tillamook: US 101/OR 6 Alternatives Study - Traffic Study Area Mile Posts

State Highway Number/Street Name	Route Number	Begin MP/Cross Street	End MP/Cross Street
Wilson River Highway No. 37	OR 6 Westbound (1 st St)	0.00 Main Street	0.28 Miller Avenue
Wilson River Highway No. 37	OR 6 Eastbound (3 rd St)	0.00 Main Street	0.28 Miller Avenue
Oregon Coast Highway No. 9	US 101 Southbound (Main Ave)	65.64 1 st Street	65.79 4 th Street
Oregon Coast Highway No. 9	US 101 Northbound (Pacific Ave)	65.64 1 st Street	65.82 4 th Street

Table 2 shows the key study area roadways and ODOT classifications. The intersection names, jurisdictions, and count information are listed in Table 3. Figure A.1 in Appendix A of the *Tillamook: US 101/OR 6 Alternatives Study Existing Conditions TM#2b* shows the location of each study intersection.

TABLE 2

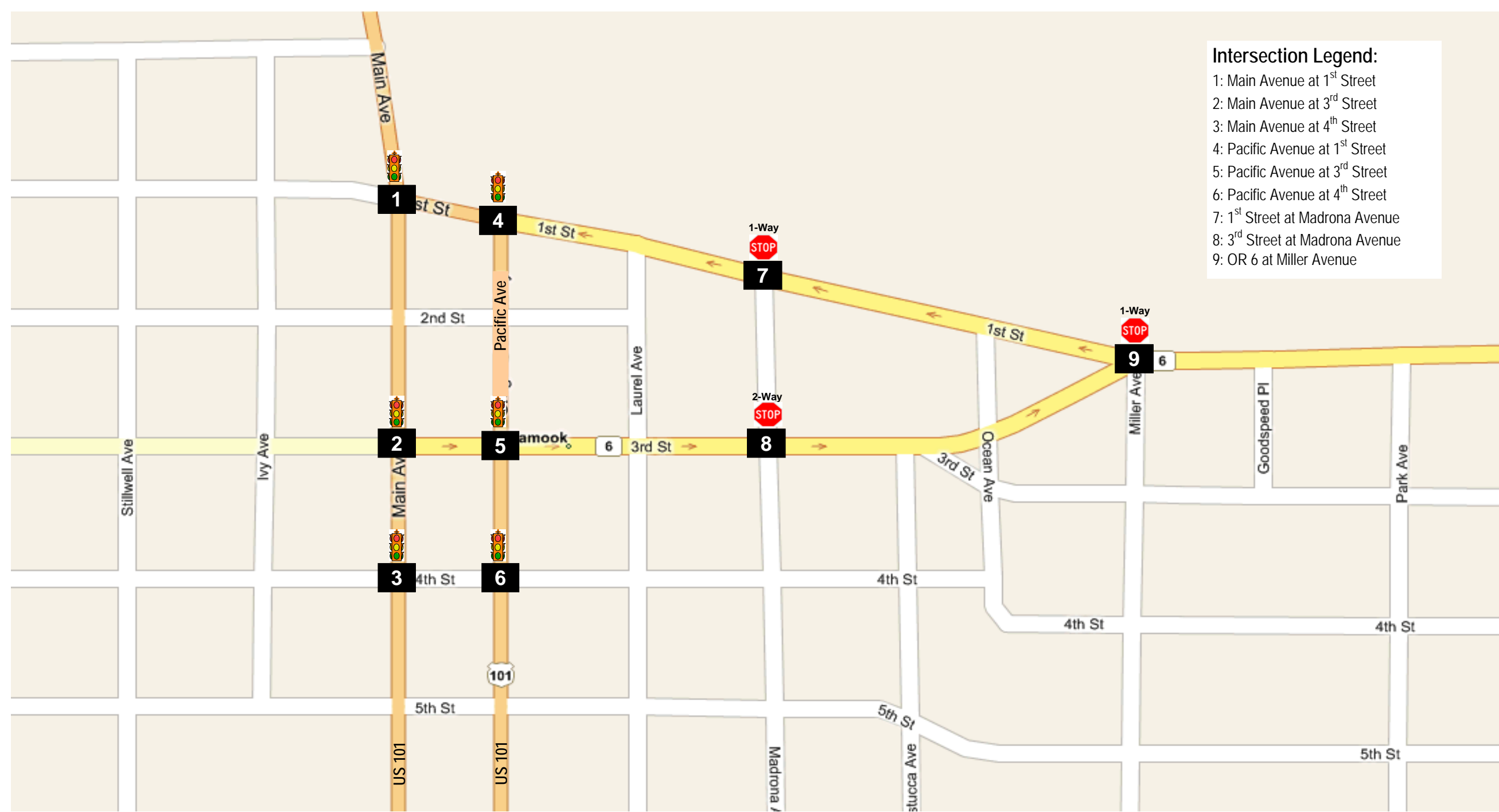
Tillamook: US 101/OR 6 Alternatives Study – Traffic Study Area Roadways

Roadway	State Highway Name	State Highway Number	ODOT Functional Classification
City of Tillamook			
1 st Street (west of Main Avenue)	N/A	N/A	Minor Collector
4 th Avenue	N/A	N/A	Minor Collector
Madrona Avenue	N/A	N/A	Local Road
Miller Avenue (north of 3 rd Street)	N/A	N/A	Local Road
Miller Avenue (south of 3 rd Street)	N/A	N/A	Minor Collector
Oregon Department of Transportation			
US 101 southbound (Main Avenue)	Oregon Coast Highway	9	Principal Arterial
US 101 northbound (Pacific Avenue)	Oregon Coast Highway	9	Principal Arterial
OR 6 westbound (1 st Street – Pacific to Main Avenue)	Wilson River Highway	37	Principal Arterial
OR 6 westbound (1 st Street east of Pacific Avenue)	Wilson River Highway	37	Minor Arterial
OR 6 eastbound (3 rd Street east of Main Avenue)	Wilson River Highway	37	Minor Arterial
OR 6 (3 rd Street west of Main Avenue)	Netarts Highway	131	Major Collector

TABLE 3

Tillamook: US 101/OR 6 Alternatives Study – Traffic Study Intersections

ID #	Intersection	Jurisdiction	Date	Count Hours
1	Main Avenue at 1 st Street	ODOT	9/30/2008	6AM-10PM
2	Main Avenue at 3 rd Street	ODOT	9/30/2008	6AM-10PM
3	Main Avenue at 4 th Street	ODOT	9/30/2008	6AM-10PM
4	Pacific Avenue at 1 st Street	ODOT	9/30/2008	6AM-10PM
5	Pacific Avenue at 3 rd Street	ODOT	9/30/2008	6AM-10PM
6	Pacific Avenue at 4 th Street	ODOT	9/30/2008	6AM-10PM
7	1 st Street at Madrona Avenue	ODOT	9/30/2008	6AM-10PM
8	3 rd Street at Madrona Avenue	ODOT	9/30/2008	6AM-10PM
9	OR 6 at Miller Avenue	ODOT	9/30/2008	6AM-10PM





Intersection Legend:

- 1: Main Avenue at 1st Street
- 2: Main Avenue at 3rd Street
- 3: Main Avenue at 4th Street
- 4: Pacific Avenue at 1st Street
- 5: Pacific Avenue at 3rd Street
- 6: Pacific Avenue at 4th Street
- 7: 1st Street at Madrona Avenue
- 8: 3rd Street at Madrona Avenue
- 9: OR 6 at Miller Avenue



FIGURE 1 Tillamook: US 101/OR 6 Alternatives Study
Traffic Study Intersections

Legend/Notes:

-  Signalized Intersection
-  Stop-Controlled Intersection
1-way or 2-way stop control

* Maps source: Microsoft Live Maps



III. Existing and Future Traffic Volumes

Turning movements over a 16-hour period were collected for each of the study area intersections. The peak hour turning movement counts will be adjusted to account for seasonal effects according to ODOT Transportation Planning Analysis Unit (TPAU) *Analysis Procedures Manual*. The Coastal Destination and Coastal Destination Routes were searched in the ATR (Automatic Traffic Recorder) Characteristic Table and none of the resulting ATR sites had the same characteristics as the study area. Therefore, the 2008 Seasonal Trend Table will be used to develop the 30th highest peak hour traffic volumes. An average of the Coastal Destination and Coastal Destination Route trends will be used as shown in Table 4. The resulting seasonal adjustment is 1.26.

TABLE 4

Tillamook: US 101/OR 6 Alternatives Study – 2008 Seasonal Trend Adjustment

Trend	15-Sep	1-Oct	Peak Period Seasonal Factor	Trend for Count Date 30-Sept	Seasonal Adjustment
Coastal Destination	0.9220	0.9877	0.8362	0.9836	1.1763
Coastal Destination Route	0.9302	1.0488	0.7797	1.0414	1.3356
Average Seasonal Adjustment					1.26

The derived 30th highest hour design volumes will be balanced between adjacent study intersections as outlined by ODOT standards. The existing conditions analysis will be conducted using the 30th highest hour volumes. If possible, the study will assign one peak hour for use in the traffic analysis. If the characteristics of the traffic count data show that different peak hours occur at different locations within the study area, multiple peak hours will be utilized in the analysis.

IV. Forecasting/Modeling Methodology

Travel demand forecasts for study intersections in the Tillamook: US 101/OR 6 Alternatives study will be determined by analyzing the ODOT Future Volume Tables. The latest tables provide 2006 traffic volumes, forecast traffic volumes for the year 2027, and a statistical descriptor (R-squared value) that provides the reliability of the forecast for all state highways. Consistent with ODOT guidelines, growth rates for future forecasts will be developed using Future Volume Table estimates with R-squared values above 0.75 for the 21-year planning period. When the adjustment factor is calculated, it will be applied to the balanced 2008 30th highest hour volumes which will then be balanced again to get the 2030 future volumes.

Based on the scope of work, up to five design alternatives will be tested as part of this project.

V. State, Regional, and Local Mobility Standards

State highway mobility standards were developed for the 1999 Oregon Highway Plan (OHP) as a method to gauge reasonable and consistent standards for traffic flow along state

highways. These mobility standards consider the classification (e.g., freeway, district) and location (rural, urban) of each state highway. Mobility standards are based on V/C ratios. The 1999 OHP, with amendments adopted by the Oregon Transportation Commission from November 1999 through January 2006, was released on August 23, 2006. This version of the 1999 OHP will be used in this study.

Table 5 shows the OHP and HDM mobility standards for each roadway in the traffic study area. These standards will be applied to all study intersections since they are all within ODOT jurisdiction. Table 6 shows the mobility standards for each intersection in the study area. Table 6 is developed from Table 5. The most conservative mobility standard for each intersecting roadway is chosen for the intersection mobility standard. Table 6 will be used to identify mobility standards in the existing and future conditions analysis.

TABLE 5

Tillamook: US 101/OR 6 Alternatives Study – Highway Mobility Standards

Highway/ Roadway	Segment	OHP Highway Classification	Highway Category	Area	Posted Speed	Applicable V/C Ratio	
						Existing or Future No-Build Operational Analysis	Future Build Operational Analysis
US 101	1 st to 3 rd Street	Statewide NHS, TR, SB, STA	Statewide (not a freight route)	STA	N/A ¹	0.90	0.90
US 101	3 rd to 4 th Street	Statewide NHS, SB, STA	Statewide (not a freight route)	STA	N/A ¹	0.90	0.90
OR 6	east of US 101	Regional FR, TR	Freight Route on a Regional Hwy	Non- MPO	<=35 mph	0.85	0.75
OR 6	west of US 101	District	District / Local Interest Road	Non- MPO	<=35 mph	0.90	0.80
Madrona Avenue	1 st to 3 rd Street	N/A	District / Local Interest Road	Non- MPO	<=35 mph	0.90	0.80
Miller Avenue	South of OR 6	N/A	District / Local Interest Road	Non- MPO	<=35 mph	0.90	0.80

1 – posted speed for this roadway segment does not affect which V/C standard is applicable

NHS – National Highway System

TR – Federally Designated Truck Route

SB – State and/or Federal Scenic Byway

STA – Special Transportation Area

FR – State Freight Route

Existing and No-Build Mobility Source: Adopted Oregon Highway Plan as Amended in July 2006 (Table 6)

Future Mobility Source: ODOT Highway Design Manual (Table 10-1)

TABLE 6

Tillamook: US 101/OR 6 Alternatives Study – Intersection Mobility Standards

Intersection		Control Type	Overriding Highway Category		Existing or Future No-Build Mobility Standard		Future Build Mobility Standard	
Main Avenue (US 101, MP 65.64)	1st Street (OR 6, MP 0.00)	Signal	Freight Route on a Regional Hwy		0.85		0.75	
Main Avenue (US 101, MP 65.74)	3rd Street (OR 6, MP 0.00)	Signal	Freight Route on a Regional Hwy		0.85		0.75	
Main Avenue (US 101, MP 65.79)	4th Street	Signal	Statewide (not a freight route)		0.90		0.90	
Pacific Avenue (US 101 MP, 65.68)	1st Street (OR 6 MP 0.00)	Signal	Freight Route on a Regional Hwy		0.85		0.75	
Pacific Avenue (US 101, PM 65.77)	3rd Street (OR 6, MP 0.03)	Signal	Freight Route on a Regional Hwy		0.85		0.75	
Pacific Avenue (US 101, MP 65.82)	4th Street	Signal	Statewide (not a freight route)		0.90		0.90	
1st Street (OR 6, MP 0.11)	Madrona Avenue	TWSC	Freight Route on a Regional Hwy ¹	District / Local Interest Road ²	0.85 ¹	0.90 ²	0.75 ¹	0.80 ²
3rd Street (OR 6, MP 0.14)	Madrona Avenue	TWSC	Freight Route on a Regional Hwy ¹	District / Local Interest Road ²	0.85 ¹	0.90 ²	0.75 ¹	0.80 ²
OR 6 (EB MP 0.28, WB MP 0.25)	Miller Avenue	TWSC	Freight Route on a Regional Hwy ¹	District / Local Interest Road ²	0.85 ¹	0.90 ²	0.75 ¹	0.80 ²

¹ Indicates OHP Mobility Standard V/C ratio for uncontrolled roadway approach² Indicates OHP Mobility Standard V/C ratio for stop controlled roadway approach**Notes:**

- Signal: Signalized Intersection
- TWSC: Two-Way Stop controlled

VI. Traffic Analysis Software and Input Assumptions

Synchro software, version 7, will be used for the intersection analysis. The reported results will be the V/C ratios from the HCM report. The assumptions are listed in Table 7.

Consultant will worked with TPAU for inputs for timing, detectors and simulation inputs.

TABLE 7

Tillamook: US 101/OR 6 Alternatives Study – Synchro Operations Parameters/Assumptions

Arterial Intersection Parameters	Condition	
	Existing (2008)	No-Build and Build Alternatives
PHF (Peak Hour Factor)	From traffic count.	- 0.85 for side street approaches - 0.90 for State Highway Minor Arterials - 0.95 for State Highway Major Arterials If traffic count has higher PHFs than default PHFs, then continue using the existing PHFs
Conflicting Bikes and Pedestrian per Hour	From traffic count, if not provided, assume 10 peds/bikes per approach	From Existing
Area Type	Default	From Existing
Ideal Saturation Flow Rate per Lane (for all movements)	1750	From Existing
Lane Width	From As-builts, field visit or ODOT website, otherwise 12 feet	From Existing
Percent Heavy Vehicles	From traffic count, otherwise 5%	From Existing
Percent Grade	From As-builts, otherwise 0%	From Existing
Parking Maneuvers per Hour	If on-street parking allowed, assume some maneuvers (approx. 1 maneuver per stall)	From Existing
Bus Blockages	From field visit, otherwise assume 0	From Existing
Intersection signal phasing and coordination	From field visit and signal timing plans	Optimize phase and cycle length, phase sequence and offset (if signals are coordinated)
Intersection signal timing optimization limits	N/A, only performed in future year analysis	60 to 120 seconds depending on the number of phases ¹
Minimum Green time	From signal timing plans	For existing signals, same as existing. If additional signal warranted, 10 seconds if no pedestrian time is required
Yellow and all-red time	From signal timing plans	For existing signals, same as existing. If additional signal warranted, (Y) = 4 seconds and (R) = 1 second
Right Turn on Red	From field visit	From existing conditions, if additional signal, then "allow"
Vehicle Queues	95th Percentile, calculated based on an average of 25 feet per vehicle. SimTraffic will be used for both signalized and unsignalized intersections (the average of at least 5 runs of 1 hour length with 15-min peak divided out) ²	Same as Existing

¹Assumptions consistent with White Paper on Application of Oregon Highway Plan Mobility Standards.

²The simulation will be for one hour with the peak 15-minutes in the first 15 minutes. The results from this simulation will be applied to signalized and unsignalized intersections. Instructions provided by TPAU.

VII. Crash Analysis

A crash analysis will be conducted in the study area. Data will be collected from ODOT for the five most recent years available at time of project start date.

Analysis will include crash rates for each study intersection and major roadway segments; as well as calculations of crash rates with comparisons to published rates of similar facilities and identification of crash patterns and causes. Any sites in the study area within the top ten (10) percent of Safety Priority Index System (SPIS) will also be identified.

The roadway segments that will be analyzed as part of the crash analysis include:

- US 101 couplet from 1st Street to 4th Street
- OR 6 couplet from Main Street to Miller Avenue

The future crash analysis will be qualitative in nature and will not include a quantitative future predictive analysis.