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Three Mile Prairie Subdivision
Traffic Impact Analysis

West of Highway 101
Florence, Oregon

Transportation Engineering
Traffic Design
Trip Generation
Access Management
Traffic Counts
Street Lighting

October 22, 2020

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I. Executive Summary

Three Mile Prairie is proposing to develop a single-family residential subdivision west and north of the intersection of Highway 101 (Highway 009) and Munsel Lake Road in Florence, Oregon (see Figure 1 in Appendix A). The proposed development plan has six phases with 231-units as shown in Figure 2. The development will convert two existing driveway accesses on Highway 101 into street intersections; one opposite Munsel Lake Road, and one approximately 850 feet north of Munsel Lake Road. The development will close a second existing driveway access on tax lot 2100.

The Three Mile Prairie development is expected to generate a total of 2246 daily trips by completion in 2026; 227 during the peak hour with 143 inbound and 84 outbound. The study area includes the proposed new intersection on Highway 101 and the Munsel Lake Road, Fred Meyer Driveway, and 46th Street intersections with Highway 101.

The five-year crash history found a total of 21 crashes between Heceta Beach Road and 46th Street on US101. Fourteen crashes occurred at intersections. The five-year crash rates for each individual intersection in the study area were below the Critical 90th Percentile Rates of ODOT intersections with similar intersection controls.

Operational analyses were performed for completion of phase 1 in 2021, phase 2 in 2023, and full development in 2026. Traffic from phase 1 of the nearby Cannery Station PUD was added to the background traffic for years 2023 and full development traffic in 2026.

The operational analyses of the study area in the year of opening, 2021, and in 2023 identified LOS = F for westbound Munsel Lake Road and in the peak hour in both years under No Build and Build conditions. However preliminary signal warrants were not met at either intersection for those years; reaching about 85% of Case B - interruption of continuous traffic warrant in 2023. Queues on Munsel Lake Road would reach 450 feet with both Three Mile Prairie at phase 2 and Cannery Station at phase 1 developments.

By 2026, Munsel Lake Road will meet 98.6% of the preliminary signal warrant for interruption of continuous traffic with full development at both sites. Three Mile Prairie at full development with without the Cannery Station development will reach 90% of the warrant. The Cannery Station at full development without Three Mile Prairie will reach 92% of the warrant. Westbound queues on Munsel Lake Road will be extensive under all stop control scenarios. It is likely a traffic signal will be required by full development of both sites or very soon thereafter. The traffic signal design should include a northbound right turn lane in addition to turn lanes on Munsel lake Road.

A right-turn lane on Highway 101 at the North access meets access management volume criteria for a right-turn lane approach some time after phase 2.

Based on the above analysis, we recommend approval of the development. When warranted, both developments should contribute to the cost of new traffic signals, based on each development's relative proportion of the total trips at those intersections.

II. Background

1. Introduction, Location and Vicinity Map

Three Mile Prairie is proposing to develop a single-family residential subdivision west and north of the intersection of Highway 101 (Highway 009) and Munsel Lake Road in Florence, Oregon (see Figure 1 in Appendix A). The purpose of this study is to document and analyze the potential traffic impacts of trips generated by the proposed development.

2. Description of Development Site

The site is tax lot 200 on Map 18121500 and contains 35.26 acres zoned Single-Family Residential by the City of Florence. The proposal is to construct 231 single-family residences. Tax lot 200 is landlocked. The Site proposes two accesses to Highway 101 through tax lots 1301 and 2100 on Map 18121420. The southern access from tax lot 1301 intersects Highway 101 directly opposite Munsel Lake Road. The northern access from tax lot 2100 (zoned Service Industrial) will intersect Highway 101 approximately 850 feet north of Munsel Lake Road. Tax lot 1301 is currently vacant. Tax lot 2100 contains an existing 2800 square feet plant nursery material sales with an existing driveway to Highway 101 at the location of the new street. The tax lot will be used to display model homes during the development period and will revert to a plant nursery material use when the subdivision is sold out.

The proposed development plan has six phases as shown in Figure 2 in Appendix A. Phase I contains 54 lots and includes the northern access to Highway 101 through tax lot 2100 scheduled to be completed in 2021. Phase II, containing 52 units and includes the southern access through tax lot 1301to Highway 101 opposite Munsel Lake Road to be completed in January 2023. The remaining phases III through VI containing 125 units are planned to be completed by 2026.

3. Existing Study Area Conditions

The north boundary of tax lot 200 is the Florence city limits. Properties to the west and south of the site are zoned Open Space and are undeveloped. To the east of the site along both sides of Highway 101 the zoning is Commercial extending to the south beyond 46th Street. To the north of tax lot 2100 the zoning is Service Industrial on both sides of Highway 101. Table 1 describes the classification and characteristics of roadways in the vicinity of the site.

Table 1: Existing Study Area Street Conditions

Street Segment	Jurisdiction/ Classification	Posted Speed	Street Width - Shoulders	Travel Lanes*	Bike Lanes	Sidewalk	On-Street Parking
Oregon Coast Hwy. (Highway 101)							
North of Munsel Lake Rd.	ODOT Principal Arterial	40**	54' - 6' both sides	2w/CTL	Both Sides	None	None
Munsel Lake Rd to Fred Meyer North		40	54' - 64" - 6' both sides	3w/CTL	Both Sides	None	None
Fred Meyer North to 46th Street		40	64'- Curb West, 6' East	3w/CTL	Both Sides	West	None
South of 46th Street		40	64' - 6' East 8' West	3w/CTL	Both Sides	None	None
Munsel Lake Road	Lane Co. Collector	35	22' - 2' both sides	2	None	None	None
Fred Meyer Driveway	Private Local	N/A	42' - Curbs both sides	2	None	South	None
46th Street	City Collector	25*	60' - Curbs both sides	2	Both Sides	Both Sides	None

* - Through lanes only ** - Posted Speed increases to 55 MPH ~ 150' North of driveway to tax lot 2100

The initial study area:
- Highway 101 @ proposed North Site Access (~MP 187.58)
- Highway 101 @ Munsel Lake Road/proposed South Access (MP 187.76)
- Highway 101 @ Fred Meyer Driveway (MP 187.84)
- Highway 101 @ 46th Street (MP 188.01)

4. Crash History

Five-year crash records for Highway 101 in the 1/2-mile section of Highway 101 MP 187.58 north of Munsel lake Road to MP 188.08 south of 46th Street, were obtained from ODOT's Crash Analysis and Reporting Unit (See Appendix B). The roadway is straight, two-lane with center-turn-lane, and a posted speed of 40 MPH. For the five-year period there were a total of 21 crashes in the 1/2-mile section. There are two types of reference populations in this section:
Midblock two-lane arterial with center-turn-lane on the arterial,
Stop controlled intersections with center-turn-lane on the arterial.

Table 2a: Midblock Sections

Midblock Highway 101 Sections	Type of Collision					Total	Dist. (mi.)	AADT	Crash Rate (mvm)*	Injury	PDO
	Rear End	Turning	Angle	Fixed-Obj	Head On						
N/o Munsel Lake Rd	0	0	0	2	1	**3**	0.26	9360	0.49	3	0
ML Rd to FM Access	1	1	0	0	0	**2**	0.11	10240	0.98	2	0
FM Access to 46th	0	0	0	0	0	**0**	0.17	10240	0.00	0	0
S/o 46th	0	2	0	0	0	**2**	0.09	10500	1.16	0	2
Total	**1**	**3**	**0**	**2**	**1**	**7**	**0.63**	**40340**	**0.53**	**5**	**2**

Table 2b: Stop Controlled Intersections

Intersection w/ Highway 101	Type of Collision					Total	AADT	Crash Rate (mev)*	Injury	PDO
	Rear End	Turning	Angle	Fixed-Obj	Head On					
Munsel Lake Road	1	6	0	0	0	**7**	11000	0.349	1	6
Fred Meyer Access	0	3	0	0	0	**3**	12315	0.133	1	2
46th Street	2	2	0	0	0	**4**	12600	0.174	3	1
Total	**3**	**11**	**0**	**0**	**0**	**14**	**35915**	**0.210**	**5**	**9**

Table 2c: Critical/90th Percentile Crash Rates

Intersection	Intersection Legs	5-Year Rate	Critical Rate
Munsel Lake Road	4*	0.349	**0.408**
Fred Meyer Access	3	0.133	**0.293**
46th Street	4*	0.174	**0.408**

* Driveway access opposite public road.

Ten crashes involved injuries, nine coded as injury-C and one coded as injury-B to a passenger. The predominant crash type involved turning movements. Eleven of the fourteen crashes involved turns onto the highway except at the Fred Meyer Access where all three crashes involved northbound vehicles turning left into the access struck by southbound vehicles.

At the Munsel Lake Road Intersection, six of the seven crashes involved left-turns from Munsel Lake Road caused by failing to yield the right-of-way. The one rear-end collision also occurred on the Munsel lake Road approach where a left-turning passenger car stopped and was struck by a passenger car following too close.

At the 46th Street intersection, there were two rear-end collisions southbound caused by inattention and following too close. There was one turning movement collisions from an apartment driveway opposite 46th Street and one northbound left-turn movement that did not yield to a southbound through vehicle.

Two of the three crashes north of Munsel Lake Road were fixed-object crashes, one northbound due to illness and one southbound caused by reckless driving. Both resulted in injury-C. The head-on collision was caused by an elderly driver's inattention and driving in the center lane and striking southbound passenger car resulting in an injury-B to a 7-year old passenger in the struck vehicle.

Overall for the five years, 2014 through 2018, the 21 crashes in the 0.50 mile section of Highway 101 computes to a crash rate of 2.30 crashes per million vehicle miles (mvm) based on traffic volumes on Highway 101 from Table 2a above. This crash rate is higher than the Crash Analysis & Reporting Unit's 2018 Table II Five Year Comparison of Crash Rates for Other Principal Arterials in Urban Fringe Areas which shows rates from 1.21 to 1.70 crashes per mvm but is lower than in Urban Cities which show rates of 2.62 to 3.11 crashes per mvm. This section of Highway 101 does not appear on the 2018 Top 15% SPIS Group listing for Region 2.

5. Existing Traffic Volumes and Classifications

Vehicle classification turning movement counts were taken at the study area intersections from 6:30 to 9:30 AM and 3:00 to 6:00 PM on January 10, 2019. The AM peak hour was 8:00 to 9:00 and PM peak hour was 3:00-4:00. Summary sheets for the traffic counts can be found in Appendix B.

6. Seasonal Factor

For analysis of state highway intersections, ODOT guidelines call for the use of design hour volumes (DHV). Design hour volumes are the 30th highest hour volume for a given year. ODOT's Analysis Procedures Manual (APM) provides three methods for evaluating the seasonal factor. The first method is to consult an existing Automatic Traffic Recorders (ATR) in the nearby area. The nearest ATR on Highway 101 is located at MP 186.46, which is 1.3 miles north of the Munsel Lake Road intersection and outside the Urban Growth Boundary. Using this location would over estimate the seasonal increase in summer traffic volumes and not include commuter traffic from the residential areas west on Heceta Beach Road. This location on Highway 101 is classified as a Coastal Destination Route. A more appropriate method is to consult the Seasonal Trend Table and average the Commuter and Coastal Destination Route from the Florence ATR 20-026 trends. The average seasonal factor for counts on January 9th is 1.57.

7. Future Year's Traffic Growth

There are two methods available for estimating future traffic levels in this area; ODOT's 2038 Future Volume Table and the Florence Transportation System Plan (TSP). The 2038 Future Volume Table projects 20-year traffic volume trends for Highway 101 at three nearby locations; the Florence ATR (20-026) located at MP 186.46, at MP 187.58 (just north of the tax lot 2100 driveway), and at MP 187.79 (0.03 miles south of Munsel lake Road. The Florence ATR is ~ 1 mile north of the development site and 0.56 miles north of Heceta Beach Road and projects an annual growth rate of 2.43%. That location is outside the Florence urbanized area and is comprised of mostly Coastal Destination Route traffic and very little commuter traffic. The two locations in the immediate study area have an annual growth rate of only 0.05 or 0.06%. The average of the three locations is 0.85%

The Florence TSP projects traffic levels in 2035 based on 2009 traffic counts and build out of the Florence urban growth boundary up to and including Heceta Beach Road area. Future year traffic projections for Highway 101 have been taken from the 2009 Florence Transportation System Plan (TSP). Figures 4-7 and 4-8 in the TSP (see Appendix B) provide PM peak hour volumes north and south of Munsel Lake Road on Highway 101 for the years 2009 and 2035. An annual growth rate can be obtained by a straight-line average growth rate averaged between the volume growth north and south of the intersection over 26 years. The average growth rate is 2.30% per year.

In discussions with ODOT staff it was agreed to use the 2.3% growth rate from the Florence TSP. Figure 3 in Appendix A shows the resulting 2020 balanced design hour volumes based on the 2019 traffic count data increased by the seasonal factor and one year's growth at each study intersection.

8. Trip Generation

The trip generation for the proposed Three Mile Prairie subdivision is taken from the Tenth Edition of the Institute of Transportation Engineers' (ITE) Trip Generation Manual website using the land use code 210 - Single-Family Detached Housing. Table 2 shows the trip generation based on the fitted curve equations.

Table 3: Trip Generation, Weekday and PM Peak Hour

Land Use (ITE Code)	Year	Total Num.	Units	Weekday		PM Peak Hour			
				Rate	Trips	Rate	Trips	In	Out
Single-Family Detached Housing (210)	2021	54	Dwelling Units	Curve	590	Curve	56	35	21
	2023	106	Dwelling Units	Curve	1097	Curve	107	67	40
	2026	231	Dwelling Units	Curve	2246	Curve	227	143	84

No reductions were made for modal split. The nearest bus top is located at the Fred Meyer store in the parking area midway between 46th Street and the driveway onto Highway 101. Service could be extended into Three Mile Prairie in the future, but no trip reductions are assumed through buildout.

9. Trip Distribution

The distribution of new trips to and from the site is assumed to display the same directional percentages as found at Heceta Beach Road at Highway 101 in the 2009 PM peak hour traffic count in the Florence Transportation System Plan (Appendix B); 75% to and from the south and 25% to and from the north. Trips were distributed to and from the commercial areas along Highway 101 South of the site based on the 2019 peak hour traffic counts. Figure 4 in Appendix A shows Peak Hour trip distribution of Three Mile Prairie trips in the study area for Phase 1.

10. Transit

Rhody Express, a fixed route bus system that loops through Florence hourly on weekdays between 10 a.m. and 6 p.m. One 16 seat bus is used to operate two routes, with the bus alternating service between the two routes: The North Loop serves areas north of 20th Street, along Highway 101, Spruce Street and Oak Street, between the Grocery Outlet and Fred Meyer. The South Loop serves areas south of 20th Street, and the Old Town District.

Link Lane provides two daily routes linking Eugene, Florence, and Yachats.

11. Pedestrian and Bicycle Facilities

There are no sidewalks along Highway 101 except for the west side of the highway starting at the commercial site approximately 130 feet south of Munsel Lake Road and extending south to 46th Street. Three Mile Prairie Subdivision will provide sidewalks on all internal streets and along Highway 101 frontages. Bike lanes are provided on both sides of Highway 101 through the study area.

12. Pipeline Projects

A Traffic Impact Analysis was submitted in July 2018 for the Cannery Station PUD located on the east side of Highway 101 south of Munsel Lake Road. The TIA indicated that the development would be developed during the same time period as Three Mile Prairie. Phase 1 of Cannery Station is now scheduled for completion in 2023; and the final phase is scheduled for 2026. Daily and PM peak hour trip generation and distribution sheets for the development are found in Appendix B. The phase 1 traffic from the Cannery Station TIA will be added to the background traffic in analysis years 2023 and 2026. Three Mile Prairie analyses for the years 2023 and 2026 will be made without and with the Cannery Station development.

The Florence TSP lists two projects proposed for the area; project 2 and nine, Munsel Lake Road traffic signal and extension to the west to Rhododendron Drive. The Traffic Analysis section analyzes the need for a traffic signal at Highway 101 and Munsel Lake Road at each development phase. The site plan shows Munsel Lake Road extended west to Oak Street (also extended per the TSP) and ending. The TSP continues Munsel Lake Road to the west, however, a new future street connection west to Rhododendron Drive would have to begin to the south on tax lot 300. This future street is not included in the analysis.

III. Traffic Analysis

1. Intersection Operations - General Procedures

For state highway intersections, ODOT uses a mobility standard based on the ratio of the **volume** of traffic using an intersection or approach compared to the **capacity** of the intersection or approach, **v/c**. As the volume of traffic nears capacity, the ratio approaches 1.0. Table 6 in the updated 1999 Oregon Highway Plan lists the maximum allowable v/c for various highway classifications, locations, and speeds. For Highway 101, a Statewide Highway Non-Freight Route, inside a UGB with non-freeway speed between 35 and 45 mph, the maximum allowed volume to capacity ratio is 0.85. For local roads, the maximum allowed volume to capacity ratio is 0.90.

For Munsel Lake Road, Lane Code 15.696 (1) (b) states: Two-way Stop and Yield Controlled Intersections: All public street intersection approaches serving more than 20 vehicles during the highest one hour period on an average weekday (typically, but not always the evening peak period between 4 p.m. and 6 p.m. during the spring or fall) must operate with a LOS "E" or better and a v/c ratio not higher than 0.95 if inside the UGB. If Signalized, Lane Code 15.696 (1) (a) states: the intersection as a whole must operate with a Level of Service (LOS) "E" or better and a volume to capacity (v/c) ratio not higher than 0.85 if inside the UGB.

The Florence TSP provides the following proposed minimum operating standards applied to City intersections: LOS "D" is considered acceptable at signalized and all way stop controlled intersections if the V/C ratio is not higher than 1.0 for the sum of critical movements. LOS "E" is considered acceptable for the poorest operating approach at two way stop intersections. LOS "F" is allowed in situations where a traffic signal is not warranted.

The Synchro program is used to evaluate the operation of the intersections in the study area. For the Stop controlled intersections, the v/c and LOS for all movements are shown. The saturation flow rate was set to 1750 vehicles per hour and the existing Peak Hour Factors (PHF's), pedestrian volumes, and heavy vehicle percentages from the traffic counts were used. SimTraffic was used to evaluate the queue lengths at the study area intersections following the guidelines in Chapter 8 of ODOT's "Analysis Procedures Manual" (APM). Five runs with a random seed were averaged. The 95th percentile queues are reported and are rounded to the next nearest 25-foot increment.

2. Year of Opening, 2021, Intersection Operational & Queuing Analysis

A capacity analysis was performed at the study area intersections for no-build and build traffic conditions in the year of opening 2021. Figure 5 in Appendix A shows the No Build and Build traffic levels in 2021.

The Synchro and SimTraffic reports are in Appendix C.

The results of the analyses are shown in Table 4.

Table 4: 2021 Intersection Operational & Queuing Analysis

Intersection / Movement	Mobility Standard	No Build V/C	No Build Delay (sec.)	No Build LOS	Build Phase 1 V/C	Build Phase 1 Delay (sec.)	Build Phase 1 LOS	Available Storage (ft.)	No Build	Build Ph. 1
Hwy 101 @ North Access										
Northbound Left turn	0.85				0.03	9.1	A	CTL		50
Eastbound Movements	LOS E				0.06	14.7	B	575		50
Hwy 101 @ Munsel Lake Rd										
Northbound Left turn	0.85	0.01	8.9	A	---	---	---	CTL	25	---
Southbound Left-turn	0.85	0.03	8.9	A	0.03	9	A	675	50	50
Eastbound (Dwy) Movements	0.95/E	0.06	28.3	D	---	---	---	N/A	50	---
Westbound Movements	0.95/E	0.82	82.4	**F**	0.36	19.7	C	625	175	125
Hwy 101 @ Fred Meyer Dwy.										
Northbound Left turn	0.85	0.09	9.1	A	0.09	9.1	A	CTL	75	75
Eastbound Left turn	LOS F	0.61	37.5	E	0.65	41.4	E	50	125	125
Eastbound Right turn	LOS F	0.11	10.9	B	0.11	10.9	B	225	275	250
Hwy 101 @ 46th Street										
Northbound Left turn	0.85	0.23	10	A	0.23	10	B	CTL	100	100
Eastbound Left turn	LOS F	0.14	27.5	D	0.15	28.1	D	200	75	75
Eastbound Right turn	LOS F	0.29	12.7	B	0.30	12.8	B	200	100	100

CTL - center turn lane

The 2021 intersection operational analysis found very little difference in the levels-of-service, except at the Munsel Lake intersection where the V/C, LOS and queues for westbound Munsel Lake Road would be reduced by closing the commercial driveway on the west side of the intersection. All intersections met ODOT standards based on V/C ratios. The Munsel Lake Road approach is within the Lane County standard for V/C but has LOS F based on delay under no build conditions. The Munsel Lake Road intersection does not meet preliminary traffic signal warrants for the no build condition (see Appendix C).

3. 2023 Intersection Operational & Queuing Analyses

Traffic levels in the study area in 2023 at the completion of Three Mile Prairie Phase 2 are shown in Figure 6 in Appendix A. The 2023 No Build design hour volumes were developed from three-year's growth from the balanced 2020 levels. Three Mile Prairie Phase 2 traffic and Cannery Station PUD Phase 1 were added separately to the study area intersections and together to develop three Build scenarios. Table 5 displays the results of the Intersection Operational and Queuing Analyses. The Synchro and SimTraffic reports are in Appendix D.

Table 5: 2023 Intersection Operational & Queuing Analysis

Intersection / Movement	Mobility Standard	No Build			Build 3 Mile Prairie Phases 1+2			Build Cannery Station Phase 1			Build 3 Mile Prairie & Cannery Station			Avail. Storage	No Build Queues	Build Three Mile Prairie	Build Cannery Station	Build Both
		V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS					
Hwy 101 @ North Acc.																		
Northbound Left turn	0.85				0.03	9.2	A				0.03	9.3	A	CTL		50		50
Eastbound Movements	LOS E				0.06	15.3	C				0.06	15.6	C	575		50		50
Hwy 101 @ Munsel Lake																		
Northbound Left turn	0.85	0.01	9	A	0.03	9.1	A	0.01	9	A	0.03	9.1	A	CTL	25	50	25	50
Southbound Left-turn	0.85	0.03	9.1	A	0.03	9.2	A	0.03	9p.2	A	0.03	9.3	A	675	50	75	50	50
Eastbound (Dwy) Movements	0.95/E	0.08	28.2	D				0.08	29.8	D				500	50		50	
Eastbound Left turn	0.95/E				0.07	52.5	F				0.07	56.6	F	100		25		50
Eastbound Through + Right	0.95/E				0.04	15.2	C				0.04	15.5	C	500		50		50
Westbound Movements	0.95/ E	1.08	163.4	**F**	**1.25**	230.4	**F**	**1.19**	205.6	**F**	**1.39**	**290**	**F**	625	300	175	125	450
Hwy 101 @ Fred Meyer																		
Northbound Left turn	0.85	0.09	9.3	A	0.10	9.3	A	0.10	9.3	A	0.10	9.4	A	CTL	75	75	50	75
Eastbound Left turn	LOS F	0.70	47.9	E	0.79	60.7	F	0.73	52.8	F	0.82	11.4	B	50	125	125	125	125
Eastbound Right turn	LOS F	0.12	11.1	B	0.13	11.3	B	0.13	11.3	B	0.12	66.6	F	225	275	250	325	250
Hwy 101 @ 47th Street																		
Southbound Left turn	0.85							0.09	17.7	C	0.11	18.9	C	CTL			50	50
Westbound left turn	LOS F							0.03	9.6	A	0.03	9.8	A	100			50	75
Westbound Right turn	LOS F							0.12	15.7	C	0.13	16.3	C	100			75	75
Hwy 101 @ 46th Street																		
Northbound Left turn	0.85	0.23	10.2	B	0.24	10.4	B	0.24	10.5	B	0.25	10.6	B	CTL	100	100	100	100
Eastbound Left turn	LOS F	0.16	29.7	D	0.17	30.6	D	0.19	32.5	D	0.20	34.1	D	200	75	125	100	75
Eastbound Right turn	LOS F	0.32	13.3	B	0.32	13.4	B	0.33	13.6	B	0.33	13.8	B	200	100	125	125	100

F - Indicates intersection does not meet preliminary signal warrants.

The westbound approach on Munsel Lake Road at Highway 101 is rated LOS = F during the peak hour. The eastbound left-turn queue on the Fred Meyer driveway together with the right-turn queue will take up all the available storage on the driveway, and will spill back into the parking area. The median on the approach to Highway 101 that limits the left-turn lane to 50 feet should be removed to lengthen both outbound lanes to 225 feet.

The Highway 101 at Munsel Lake Road intersection again did not meet preliminary signal warrants under any scenario (Appendix D). However with the intersection is essentially at capacity under the No Build and all Build conditions. An intersection improvement to widen Munsel Lake Road approach to provide separate left and through-right lanes was investigated for the scenario with both Three Mile Prairie and Cannery Station traffic. The results below show that the left-turn lane reduced the queues on Munsel Lake Road but had little effect on westbound delay and LOS.

Table 5a. 2023 Intersection Operational & Queuing with Munsel Lake Road Improvements

Intersection / Movement	Mobility Standard	Build V/C	Build Delay	Build LOS	Available Storage	Queue
Hwy 101 @ Munsel Lake Rd						
Westbound Left turn	0.95/E	**1.27**	**279.6**	**F**	150	150
Westbound Through + Right	0.95/ E	0.17	18.6	C	500	50

4. 2026 Intersection Operational & Queuing Analyses

Traffic levels in the study area in 2026 after the completion of Three Mile Prairie Phase 3 through 6 are shown in Figure 7 in Appendix A. The 2020 adjusted design hour volumes were increased for six-year's growth. Table 6 displays the results of the Intersection Operations Analysis and the 95th Percentile Queuing Analysis results assuming no changes to the existing roadways. The Synchro and SimTraffic reports are in Appendix E.

Table 6: 2026 Intersection Operational & Queuing Analysis

Intersection / Movement	Mobility Standard	No Build			Build 3 Mile Prairie All Phases			Build Cannery Station - All Phases			Build 3 Mile Prairie & Cannery Station			Avail. Storage	No Build Queues	Build Three Mile Prairie	Build Cannery Station	Build Both
		V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS					
Hwy 101 @ North Acc.																		
Northbound Left turn	0.85				0.07	9.8	A				0.07	10.1	B	CTL		75		75
Eastbound Movements	LOS E				0.14	18	C				0.151	19.6	C	575		75		50
Hwy 101 @ Munsel Lake																		
Northbound Left turn	0.85	0.01	9.1	A	0.06	9.5	A	0.01	9.2	A	0.06	9.5	A	CTL	25	50	25	50
Southbound Left-turn	0.85	0.04	9.3	A	0.04	9.5	A	0.09	9.7	A	0.10	9.9	A	675	50	50	100	75
Eastbound (Dwy) Movements	0.95/E	0.09	32.2	D				0.12	43.9	D				500	50		50	
Eastbound Left turn	0.95/E				0.20	91	F				0.34	172.1	F	100		25		50
Eastbound Through + Right	0.95/E				0.10	17.4	C				0.11	18.1	C	500		75		75
Westbound Movements	0.95/ E	1.29	245.8	**F**	**1.96**	552.3	**F**	**2.65**	**838.6**	**F**	**3.87**	**1411.5**	**F**	625	150	**775**	**675**	**675**
Hwy 101 @ Fred Meyer																		
Northbound Left turn	0.85	0.10	9.5	A	0.11	9.7	A	0.11	9.8	A	0.11	10	A	CTL	75	75	75	75
Eastbound Left turn	LOS F	0.80	64.5	F	1.02	116.9	F	0.89	86.8	F	1.14	162.1	F	50	100	125	125	125
Eastbound Right turn	LOS F	0.14	11.4	B	0.14	11.7	B	0.14	11.8	B	0.15	12.1	B	225	300	250	250	250
Hwy 101 @ 47th Street																		
Southbound Left turn	0.85							0.09	17.7	C	0.04	10.7	B	CTL			50	50
Westbound left turn	LOS F							0.03	9.6	A	0.35	27.2	D	100			150	75
Westbound Right turn	LOS F							0.12	15.7	C	0.15	19.5	C	100			150	75
Hwy 101 @ 46th Street																		
Northbound Left turn	0.85	0.27	10.7	B	0.28	11	B	0.30	11.7	B	0.32	12	B	CTL	125	100	125	125
Eastbound Left turn	LOS F	0.20	34.6	D	0.25	38.7	D	0.31	32.5	D	0.37	55.2	F	200	100	100	250	125
Eastbound Right turn	LOS F	0.34	13.8	B	0.37	14.5	B	0.33	13.6	B	0.40	16	C	200	100	150	200	100

The full development of the Cannery Station adds considerable traffic and extensive queues on the Munsel Lake Road approach. However, the preliminary signal warrant calculation falls just short (98.6%) of meeting Case B with full development of both sites. The model was rerun for each of the three build scenarios with a traffic signal in place. For the Cannery Station, westbound improvements to the Munsel Lake Road approach were assumed. A northbound right-turn pocket was added when both developments were in place in order to achieve the mobility standard. The results are shown in Table 6a.

Table 6a: 2026 Intersection Operational & Queuing Analysis - Traffic Signal at Munsel Lake Road

Intersection / Movement	Mobility Standard	Build 3 Mile Prairie All Phases			Build Cannery Station - All Phases			Build 3 Mile Prairie & Cannery Station			Build 3 Mile Prairie & Cannery Station Add NB RT Lane		
		V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS	V/C	Delay (sec.)	LOS
Hwy 101 @ Munsel Lake Road	0.85	0.66	18.7	B	0.75	23.1	C	**0.89**	26.1	C	0.75	16.0	B
Lanes	Available Storage	Queues			Queues			Queues			Queues		
Northbound Left turn	400	100			50			100			125		
Northbound Through + (Right)	400	325			425			375			300		
Northbound Right turn	150	---			---			---			125		
Southbound Left-turn	825	50			150			125			150		
Southbound Through+Right	825	200			325			325			300		
Eastbound Left turn	100	50			---			50			50		
Eastbound Through + Right	500	50			50			50			75		
Westbound Left turn	400	175			125			150			150		
Westbound Through+Right	625	100			100			125			100		

5. Turn Lanes on Highway 101

Left-turn and right-turn lanes can improve safety and increase the capacity of a roadway by allowing slower moving left-turning vehicles to leave the through lanes and by providing a refuge for left turning vehicles to wait for an adequate gap in oncoming traffic. There is a continuous center-turn-lane on Highway 101 extending throughout the entire study area beginning north of Heceta Beach Road. ODOT provides an evaluation process for these auxiliary lanes that examines three criteria, vehicular volumes, crash experience, and special cases, any one of which could warrant the provision of a left-turn or right-turn lane. This section will evaluate the right-turn criteria at the Highway 101 intersections with North Access road and Munsel Lake Road.

Criterion 1: For right-turns the vehicular volume criterion compares the right-turning volume to the total volumes in the right most lane at various speeds. The criterion for both cases is evaluated using the resulting design hour traffic levels for the Build-out conditions in 2026 (see Figure 7 in Appendix A), using graphs found in Appendix B. The results show that the right-turn lane will meet the vehicular volume criterion after phase 2 of the site. It should be noted however, that all site traffic arriving from the north has been allocated to the North Access in all phases. After phase 1, a second connection into the development will be available at the Munsel Lake Road intersection. However, this connection is at the south end of the development and could serve a maximum of one-half of the site.

Criterion 2 is crash experience. The 5-year crash history (2014 through 2018) did not identify any crashes at or near the proposed accesses that would be susceptible to correction by a right-turn lane. The one crash located at .01 miles south of the access was a single car collision with a fixed-object (power pole) caused by reckless driving.

Criterion 3 relates to special cases such as nearby railroad crossings, passing lanes, or other geometric or operational characteristics of the roadway. There are no special cases or concerns that would necessitate a right-turn lane at the access.

Based on this analysis, a right-turn lane could be required at the North Access intersection after Phase 2 of the development.

6. Access Management

The Three Mile Prairie Subdivision proposes to gain access to the surrounding street system by changing the use of two existing private driveways on Highway 101 serving tax lots 1301 and 2100 on Assessor"s Map 18121420 and converting them to public street intersections. In addition, the development will close an existing driveway on tax lot 2100, making a net decrease of one access on the highway. Never-the-less the area does not meet ODOT's access spacing standards after the elimination of one private driveway access.

Highway 101 is straight and level in the study area. ODOT access management rules state that intersections must have, at a minimum, stopping sight distance (SSD) but should also have intersection sight distance (ISD). SSD standards are found in Table 3-1in the AASHTO Policy on Geometric Design of Highways and Streets. For A posted speed of 40 MPH requires a sight distance standard for 45 MPH of 360 feet. The ISD standards are provided in OAR 734-051-4020 (2) (c) are found in Table 2 Intersection Sight Distance (ISD) Standards. For 45 MPH the ISD is 500 feet for right turns and 530 feet for left turns. There are no impediments to sight in either direction at either intersection.

Channelization standards involve the roadway lane configuration necessary to safely move traffic on and off the highway by means of auxiliary turn lanes. A center-turn-lane exists throughout the study area and the right-turn lane analysis above demonstrates that traffic volumes may warrant a right turn lane in the future.

IV. Conclusions and Recommendations

- The proposed Three Mile Prairie Subdivision at full development will generate an estimated 2246 daily trips and 227 trips in the peak hour.
- The Three Mile Prairie Subdivision will convert two existing driveway accesses on Highway 101 into street intersections; one on tax lot 1301 will be opposite Munsel Lake Road, and one along the south boundary of tax lot 2100 will be approximately 850 feet north of Munsel Lake Road. The development will close a second existing driveway access on tax lot 2100. Three Mile Prairie Subdivision must make application to ODOT for access permits for the North Access and Munsel Lake Road extension connections to Highway 101.
- The crash rate for the ½ mile section is higher than the Crash Analysis & Reporting Unit's 2018 Table II Five Year Comparison of Crash Rates for Other Principal Arterials in Urban Fringe Areas which shows rates from 1.21 to 1.70 crashes per mvm but is lower than in Urban Cities which show rates of 2.62 to 3.11 crashes per mvm. This section of Highway 101 does not appear on the 2018 Top 15% SPIS Group listing for Region 2. The crash rates for each individual intersection in the study area were below the Critical 90th Percentile Rates of ODOT intersections with similar intersection controls.
- The operational analyses of the study area in the year of opening, 2021, and at completion of phase 2 in 2023 identified LOS = F for westbound Munsel Lake Road tn the peak hour in both years under No Build and Build conditions with and without the Cannery Station development. Queues on westbound Munsel Lake Road would reach 450 feet with both Three Mile Prairie at phase 2 and Cannery Station at phase 1 developments. ODOT preliminary signal warrants were not met at the intersection through 2023.
- By 2026, the westbound movements at Munsel Lake Road are at LOS = F with extensive queues. The Munsel Lake Road intersection will meet 98.6% of the preliminary signal warrant for interruption of continuous traffic with full development at both sites. Three Mile Prairie at full development with without the Cannery Station development will reach 90% of the warrant. The Cannery Station at full development without Three Mile Prairie will reach 92% of the warrant.
- A right-turn lane on Highway 101 at the North Access will meet warrants soon after phase 2 is completed. A continuous left-turn lane exists throughout the study area. Sight distance is adequate for all movements at both intersections. The development will close an existing driveway on tax lot 2100, making a net decrease of one access on the highway. However the area does not meet ODOT's access spacing standards after the elimination of one private driveway access.

Based on the above analysis, we recommend approval of the development. There are potential intersection capacity issues by 2026 with full development of Three Mile Prairie and the Cannery Station PUD. By 2026 the Munsel Lake Road intersection will meet 98% of Preliminary Interruption of Continuous Traffic Signal Warrant. When warranted, both developments should contribute to the cost of new traffic signals, based on each development's relative proportion of the total trips at those intersections.

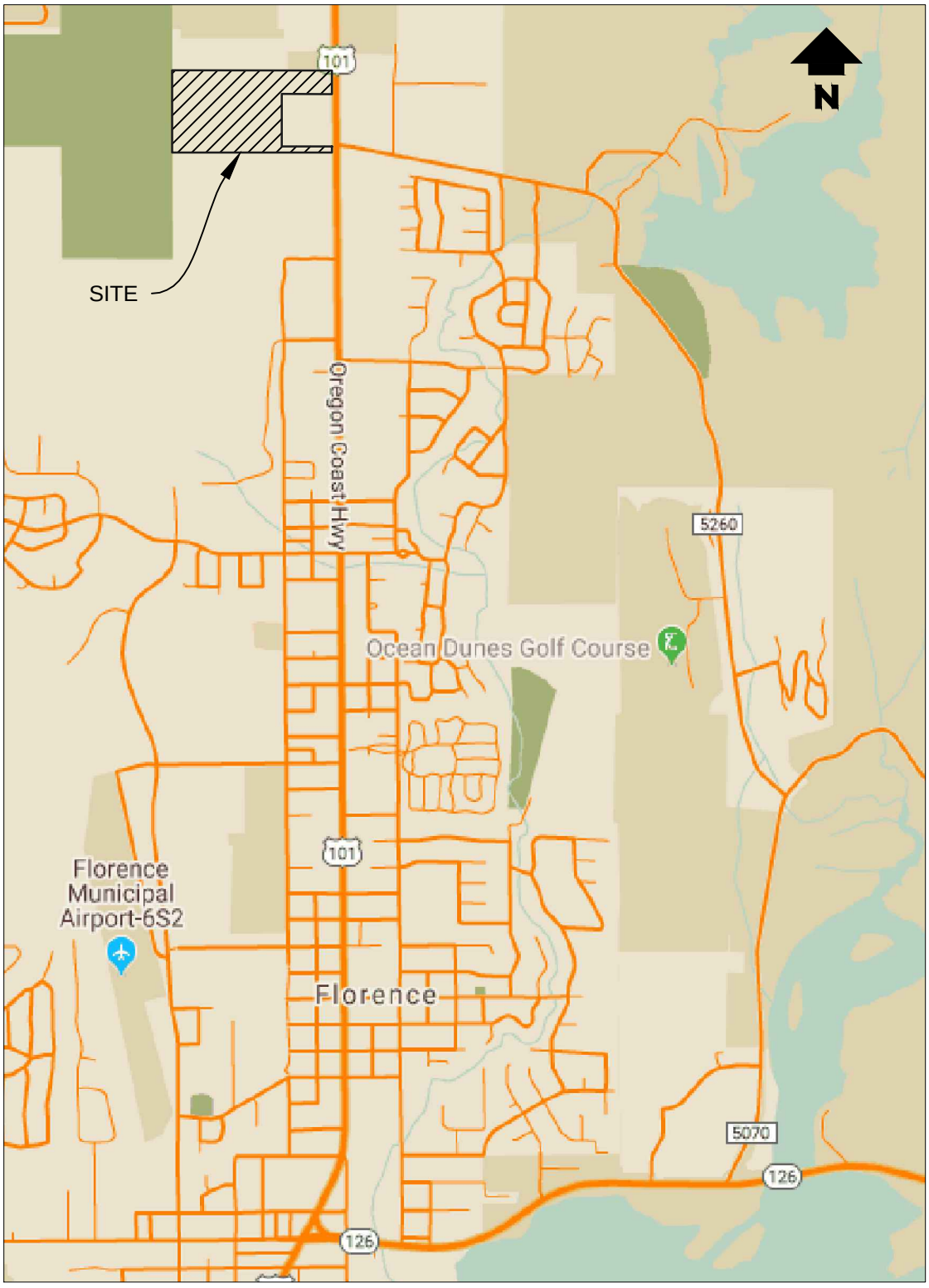
Appendix A

Figures

Figure 1

Three Mile Prairie Traffic Impact Study

Vicinity Map

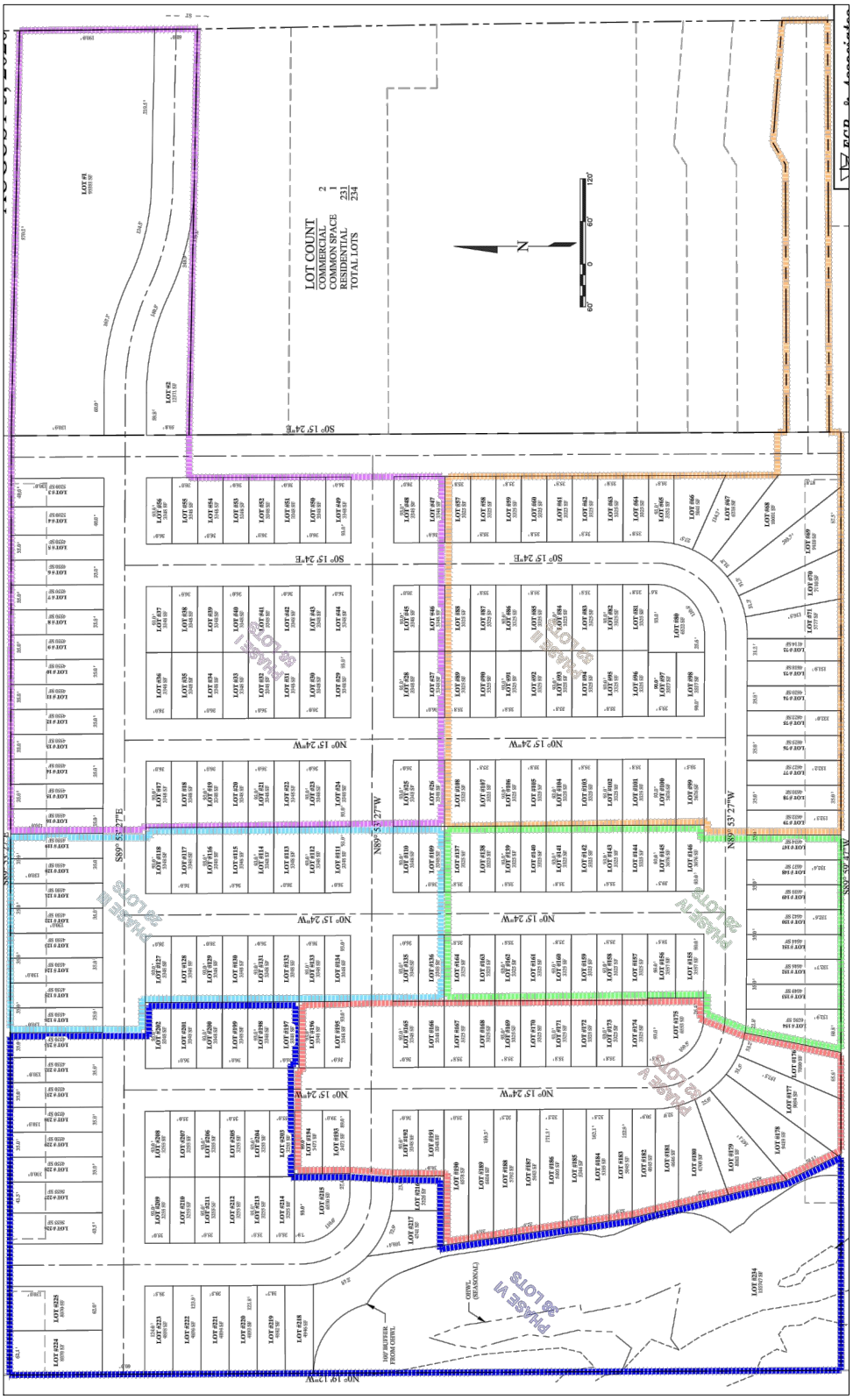


Access Engineering

Figure 2

Three Mile Prairie Traffic Impact Study

Site Plan



Access Engineering

Figure 3

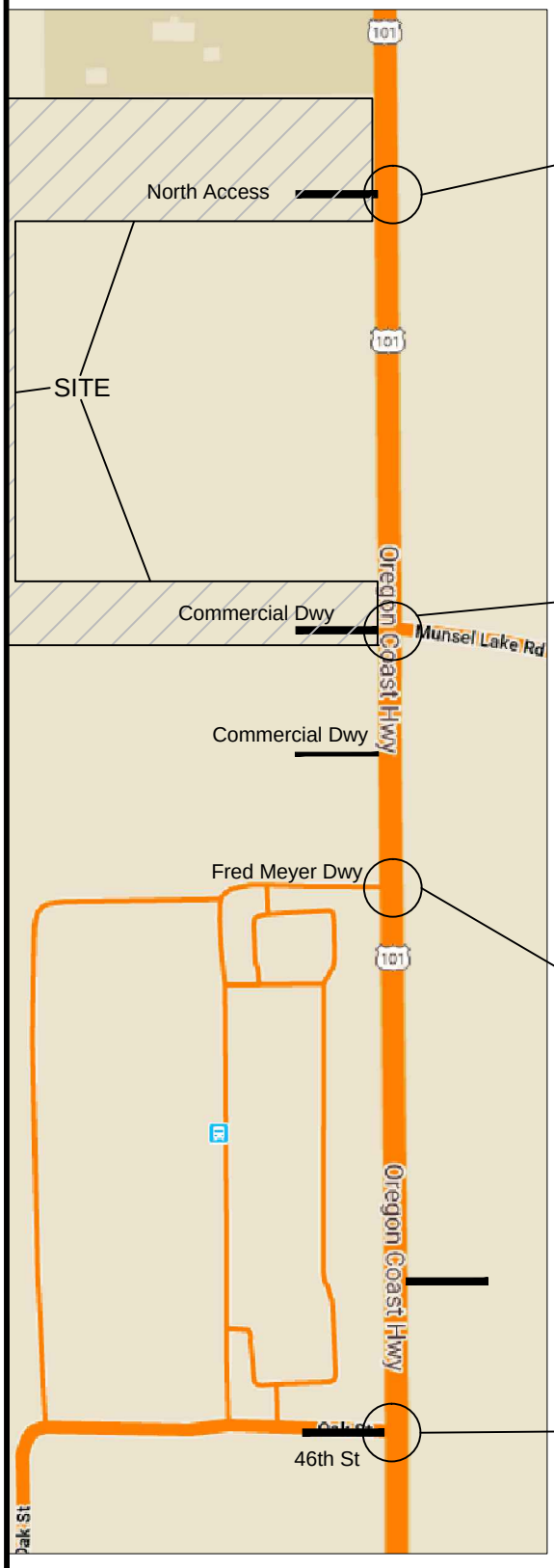
Three Mile Prairie Traffic Impact Study

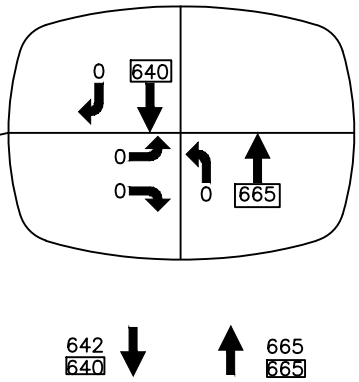
Geometry & 2020 Design Hour Volumes

LEGEND

XX - DHV's

[XX] - Balanced DHV





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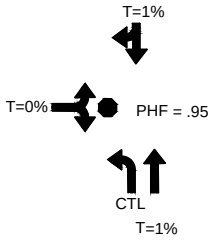

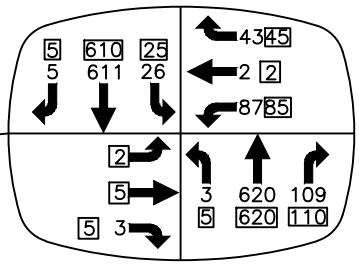

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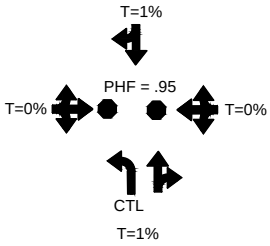

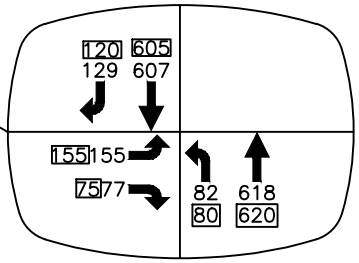

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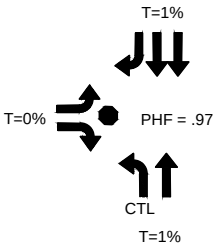
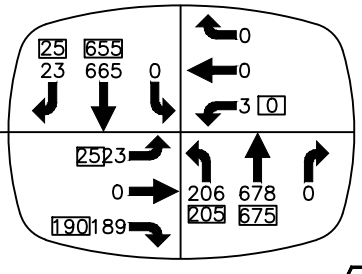
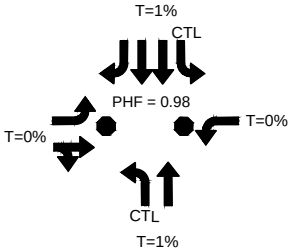




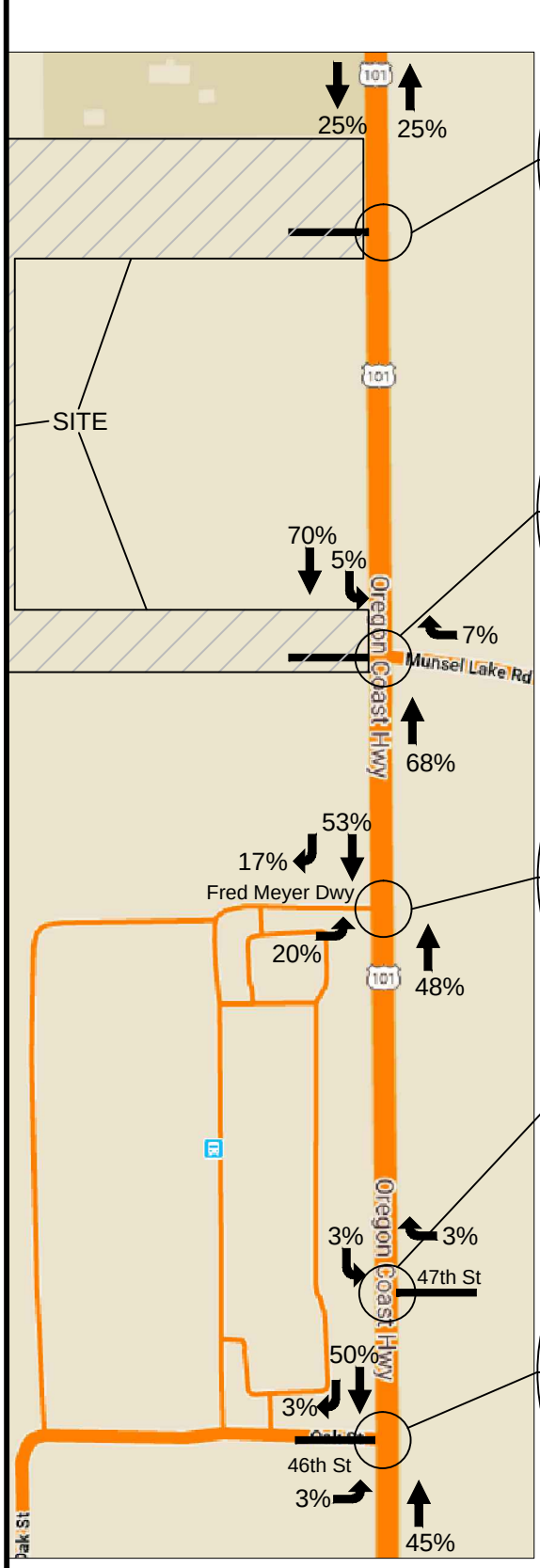


Access Engineering

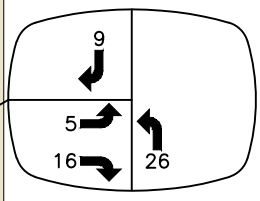
Figure 4

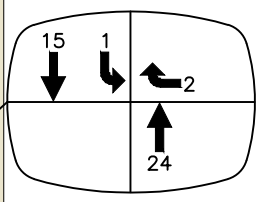
Three Mile Prairie Traffic Impact Study

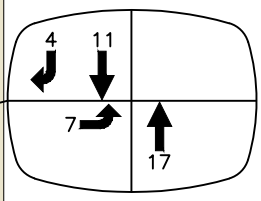
Site Trip Distribution

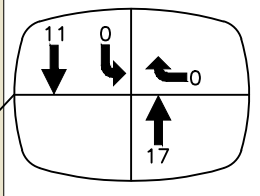


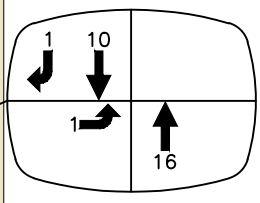
2021 Phase 1



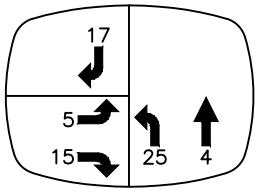


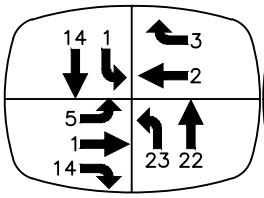


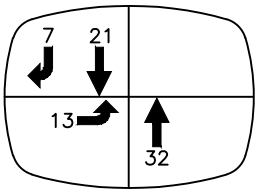


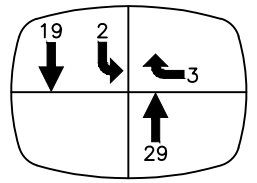


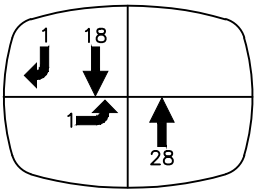
2023 Phase 2



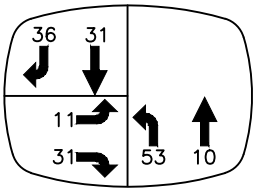


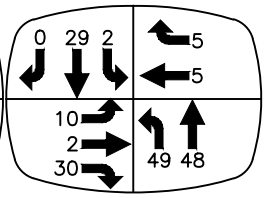


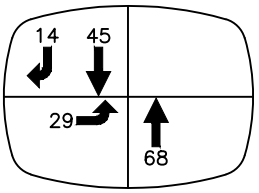


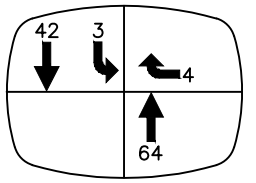


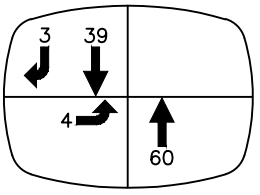
2026 Phase 3











Access Engineering

Figure 5

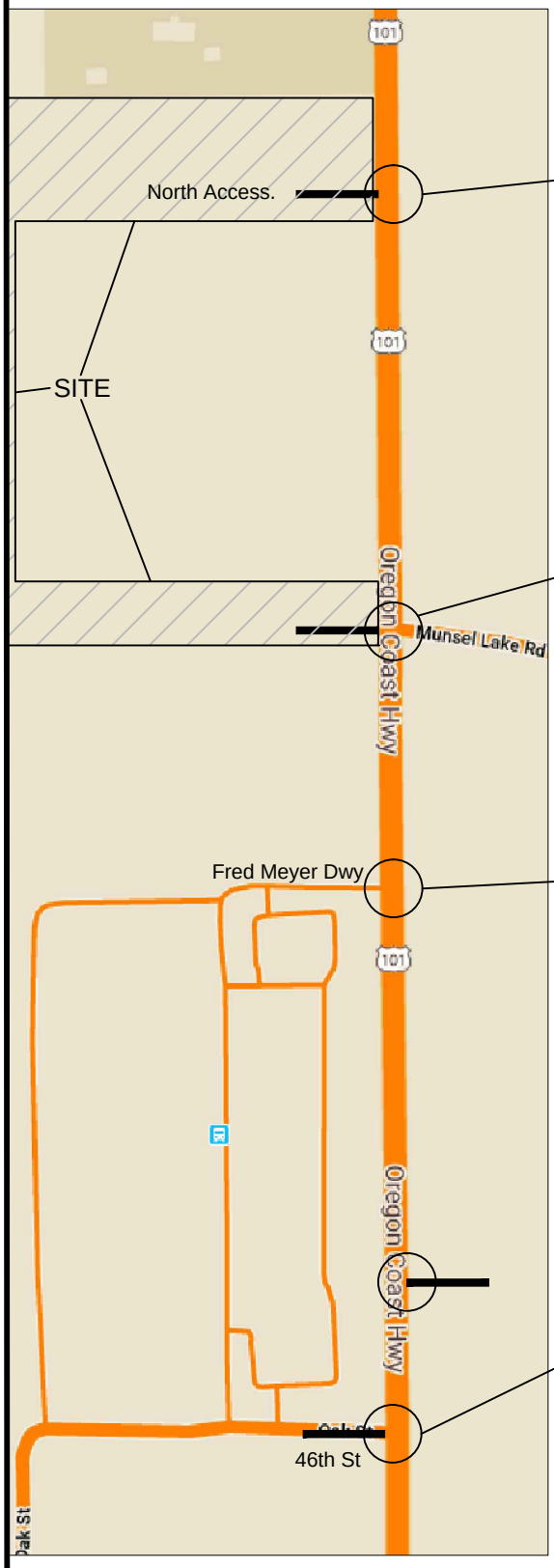
Three Mile Prairie Traffic Impact Study

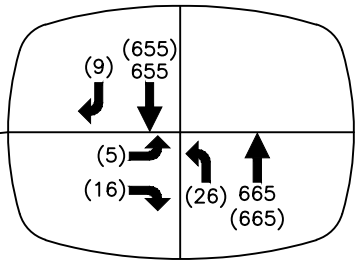
2021 DHV's

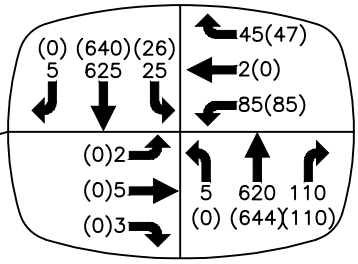
LEGEND

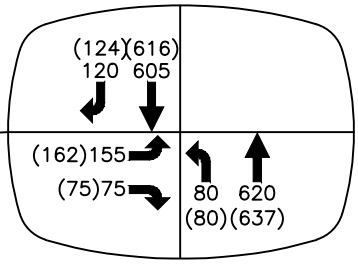
XX - No Build

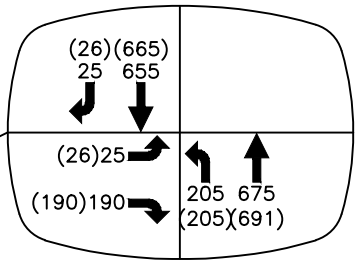
(XX) - Build Phase 1











Access Engineering

Figure 6

Three Mile Prairie Traffic Impact Study

2023 Traffic Levels

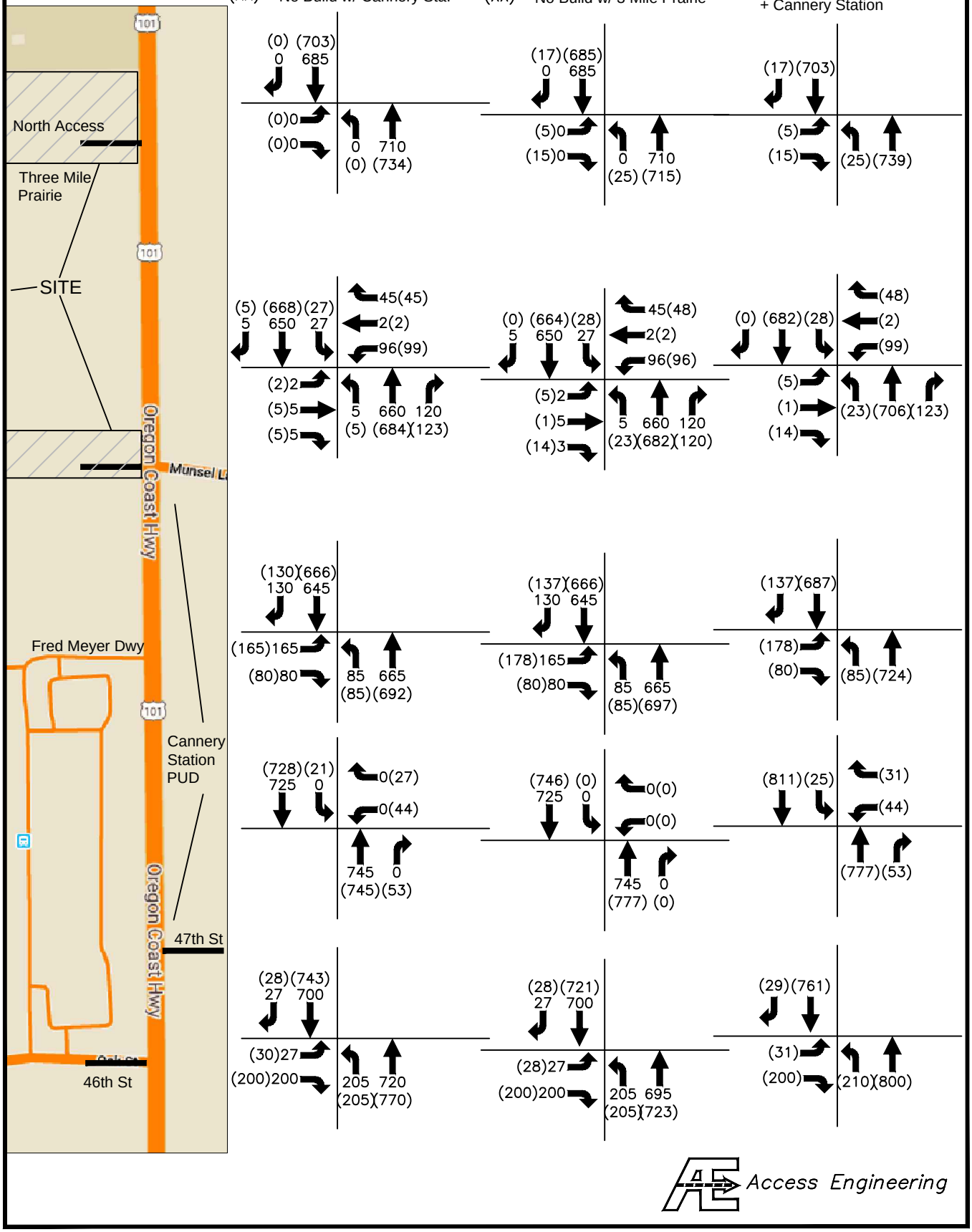
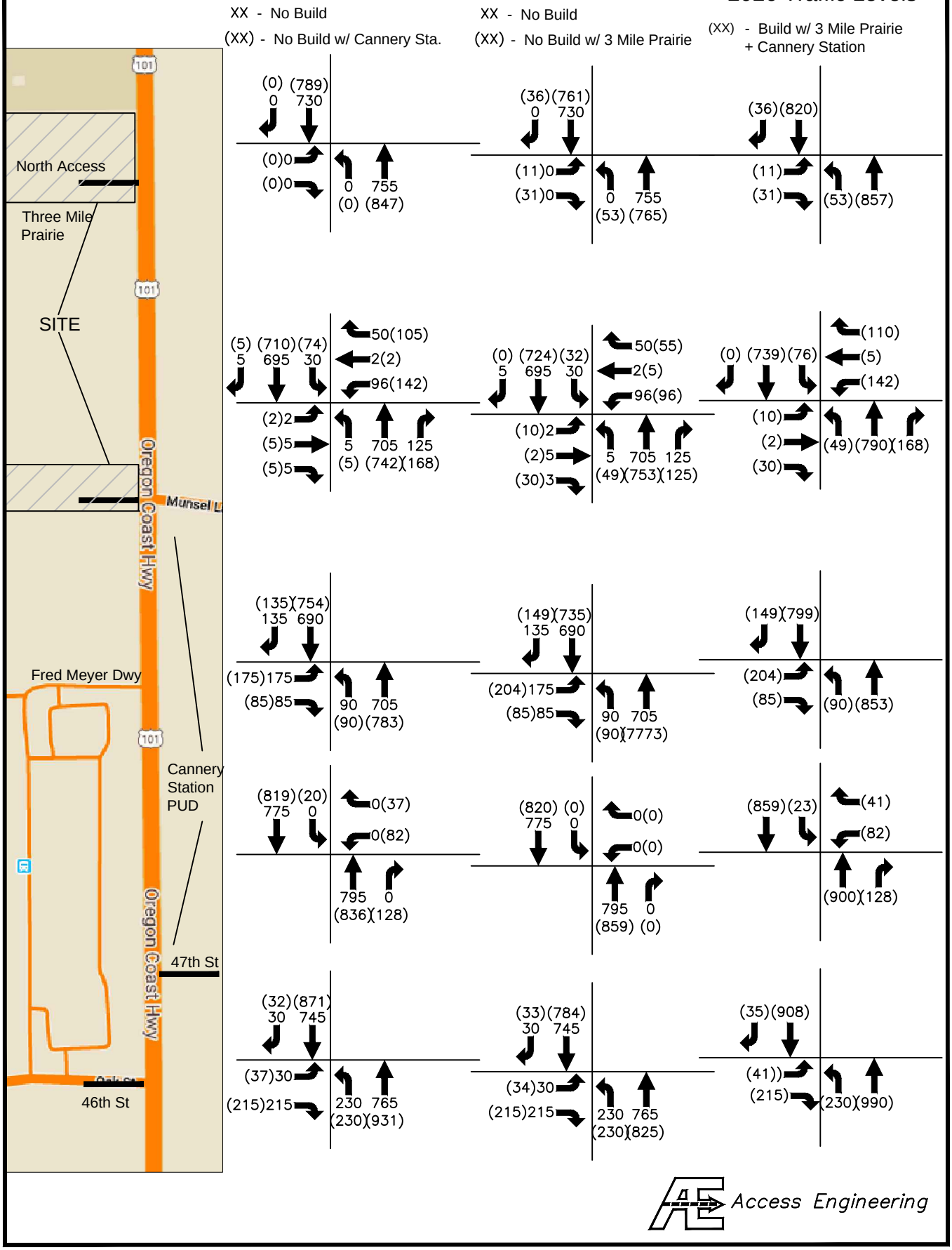


Figure 7

Three Mile Prairie Traffic Impact Study

2026 Traffic Levels



Appendix B

Crash Data,Traffic Data & Calculations

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANAYLYSIS AND REPORTING UNIT
CONTINUOUS SYSTEM CRASH LISTING

009: OREGON COAST

Highway 009 ALL ROAD TYPES, MP 187.58 to 188.08 01/01/2014 to 12/31/2018, Both Add and Non-Add mileage

1 - 21 of 21 Crash records shown.

	S		D	M																										
SER#	P		R	J	S	W	DATE	COUNTY	RD# FC	CONN#	RD CHAR	INT-TYPE						SPCL USE												
INVEST	E	A	U	I	C	O	DAY	CITY	COMPNT	FIRST STREET	DIRECT	(MEDIAN)	INT-REL	OFFRD	WTHR	CRASH		TRLR QTY	MOVE				A	S						
RD DPT	E	L	G	N	H	R	TIME	URBAN AREA	MLG TYP	SECOND STREET	LOCTN	LEGS	TRAF-	RNDBT	SURF	COLL		OWNER	FROM		PRTC	INJ	G	E	LICNS	PED				
UNLOC?	D	C	S	V	L	K	LAT	LONG	MILEPNT	LRS		(#LANES)	CONTL	DRVWY	LIGHT	SVRTY	V#	TYPE	TO	P#	TYPE	SVRTY	E	X	RES	LOC	ERROR	ACT	EVENT	CAUSE
02267	N	N	Y	N	N	N	06/24/2016	LANE	1 14		STRGHT		N	Y	CLR	FIX OBJ	01	NONE 0	STRGHT										053	33
CITY							FR	FLORENCE	MN 0	OREGON COAST HY	N	(NONE)	NONE	N	DRY	FIX		PRVTE	N -S									000	053	00
Y							9P	FLORENCE UA	187.59	N MUNSEL LAKE RD	01			Y	DARK	INJ		PSNGR CAR		01	DRVR	INJC	48	M	SUSP		051,080,081	000		33
N							44 0 45.44	-124 6 5.91		000900100S00		(02)													OR<25					
02049	N	N	N	N	N	N	06/27/2015	LANE	1 14		STRGHT		N	N	CLR	O-STRGHT	01	NONE 0	STRGHT										004	27
STATE							SA	FLORENCE	MN 0	OREGON COAST HY	N	(NONE)	UNKNOWN	N	DRY	HEAD		PRVTE	S -N									000		00
Y							3P	FLORENCE UA	187.70	N MUNSEL LAKE RD	03			N	DAY	INJ		PSNGR CAR		01	DRVR	INJC	69	F	OTH-Y		080,044	038		27
N							44 0 39.72	-124 6 5.8		000900100S00		(02)													N-RES					
																	01	NONE 0	STRGHT											
																		PRVTE	S -N									000		00
																		PSNGR CAR		02	PSNG	INJC	75	F			000	000		00
																	02	NONE 0	STRGHT											
																		PRVTE	N -S									000		00
																		PSNGR CAR		01	DRVR	INJC	24	F	OR-Y		000	000		00
																									OR<25					
																	02	NONE 0	STRGHT											
																		PRVTE	N -S									000		00
																		PSNGR CAR		02	PSNG	INJB	07	M			000	000		00
02767	N	N	N	N			07/28/2016	LANE	1 14		STRGHT		N	Y	CLR	FIX OBJ	01	NONE 0	STRGHT										079,037	17
NO RPT							TH	FLORENCE	MN 0	OREGON COAST HY	N	(NONE)	UNKNOWN	N	DRY	FIX		PRVTE	S -N									000	079,037	00
Y							8A	FLORENCE UA	187.72	N MUNSEL LAKE RD	06			N	DAY	INJ		PSNGR CAR		01	DRVR	INJC	73	F	OR-Y		000	028		17
N							44 0 38.68	-124 6 5.78		000900100S00		(02)													OR<25					
00593	N	N	N	N	N	N	02/28/2018	LANE	1 14		INTER	3-LEG	N	N	RAIN	S-1STOP	01	NONE 9	STRGHT											02,07,27
CITY							WE	FLORENCE	MN 0	N MUNSEL LAKE RD	UN		STOP SIGN	N	WET	REAR		N/A	E -W									000		00
N							11A	FLORENCE UA	187.76	OREGON COAST HY	06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	Unk	UNK		000	000		00
N							44 0 36.6	-124 6 5.74		000900100S00		(02)													UNK					
																	02	NONE 9	STOP											
																		N/A	E -W									013		00
																		PSNGR CAR		01	DRVR	NONE	00	Unk	UNK		000	000		00
																									UNK					
02787	N	N	N	N	N	N	09/05/2014	LANE	1 14		INTER	3-LEG	N	N	CLR	ANGL-OTH	01	NONE 0	TURN-L											02
NONE							FR	FLORENCE	MN 0	N MUNSEL LAKE RD	S		STOP SIGN	N	DRY	TURN		PRVTE	E -S									015		00
N							3P	FLORENCE UA	187.76	OREGON COAST HY	05	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	87	F	OR-Y		016,028	000		02
N							44 0 36.6	-124 6 5.74		000900100S00															OR<25					
																	02	NONE 0	STRGHT											
																		PRVTE	N -S									000		00
																		PSNGR CAR		01	DRVR	NONE	48	M	OTH-Y		000	000		00
																									N-RES					
03774	N	N	N	N			10/18/2017	LANE	1 14		INTER	3-LEG	N	N	RAIN	ANGL-OTH	01	NONE 9	TURN-L											02
STATE							WE	FLORENCE	MN 0	N MUNSEL LAKE RD	CN		STOP SIGN	N	WET	TURN		N/A	E -S									015		00
N							1P	FLORENCE UA	187.76	OREGON COAST HY	01	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	00	Unk	UNK		000	000		00
N							44 0 36.6	-124 6 5.74		000900100S00															UNK					
																	02	NONE 9	TURN-L											
																		N/A	N -E									000		00

1 - 21 of 21 Crash records shown.

																PSNGR	CAR			01	DRVR	NONE	00	Unk	UNK		000		000		00
																									UNK						
03643	N	N	N	N	N	N	11/10/2014	LANE		1	14			INTER	3-LEG		N		N	CLR	ANGL-OTH	01	NONE	0	STRGHT							02
NO RPT							MO	FLORENCE		MN	0	N MUNSEL LAKE RD		CN			STOP SIGN		N	DRY	TURN		PRVTE		S -N						000		00
N							5P	FLORENCE UA		187.76		OREGON COAST HY		02	0				N	DUSK	PDO		PSNGR	CAR		01	DRVR	NONE	50	M	OR-Y	000	000		00
N							44 0 36.6	-124 6 5.74				000900100S00																			OR<25				
																						02	NONE	0	TURN-L							
																							PRVTE		E -S						015		00
																PSNGR	CAR			01	DRVR	NONE	54	M	OR-Y		028		000		02
																									OR<25						
03357	N	N	N	N	N	N	09/20/2017	LANE		1	14			INTER	3-LEG		N		N	CLR	ANGL-OTH	01	NONE	0	STRGHT							02
CITY							WE	FLORENCE		MN	0	N MUNSEL LAKE RD		CN			STOP SIGN		N	DRY	TURN		PRVTE		S -N						000		00
N							2P	FLORENCE UA		187.76		OREGON COAST HY		02	0				N	DAY	INJ		PSNGR	CAR		01	DRVR	INJC	50	F	OR-Y	000	000		00
N							44 0 36.6	-124 6 5.74				000900100S00																			OR<25				
																						02	NONE	0	TURN-L							
																							PRVTE		E -S						015		00
																PSNGR	CAR			01	DRVR	NONE	24	M	OR-Y		000		000		00
																									OR<25						
03659	N	N	N	N	N	N	10/11/2017	LANE		1	14			INTER	3-LEG		N		N	CLR	ANGL-OTH	01	NONE	9	STRGHT							02
CITY							WE	FLORENCE		MN	0	N MUNSEL LAKE RD		CN			STOP SIGN		N	DRY	TURN		N/A		E -W						015		00
N							1P	FLORENCE UA		187.76		OREGON COAST HY		02	0				N	DAY	PDO		PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK	000	000		00
N							44 0 36.6	-124 6 5.74				000900100S00																			UNK				
																						02	NONE	9	STRGHT							
																							N/A		S -N						000		00
																MOTRHOME				01	DRVR	NONE	00	Unk	UNK		000		000		00
																									UNK						
01176	N	N	N	N			04/25/2018	LANE		1	14			INTER	3-LEG		N		N	CLR	ANGL-OTH	01	NONE	9	TURN-L							02
NO RPT							WE	FLORENCE		MN	0	OREGON COAST HY		CN			STOP SIGN		N	DRY	TURN		N/A		E -S						015		00
N							1P	FLORENCE UA		187.76		N MUNSEL LAKE RD		02	0				N	DAY	PDO		PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK	000	000		00
N							44 0 36.61	-124 6 5.72				000900100S00																			UNK				
																						02	NONE	9	TURN-L							
																							N/A		N -E						000		00
																PSNGR	CAR			01	DRVR	NONE	00	Unk	UNK		000		000		00
																									UNK						
00060	Y	N	N	N	N	N	01/06/2015	LANE		1	14			ALLEY			N		N	CLR	ANGL-OTH	01	NONE	0	STRGHT							01
NO RPT							TU	FLORENCE		MN	0	OREGON COAST HY		S	(NONE)		UNKNOWN		N	DRY	TURN		PRVTE		N -S						000		00
N							6A	FLORENCE UA		187.79		N MUNSEL LAKE RD		03					N	DLIT	INJ		PSNGR	CAR		01	DRVR	INJC	86	M	OR-Y	042	000		01
N							44 0 35	-124 6 5.72				000900100S00			(03)																OR<25				
																						02	NONE		TURN-R							
																							PRVTE		W -S						018		00
																TRUCK				01	DRVR	NONE	53	M	OR-Y		028		000		00
																									OR<25						
00108	N	N	N	N	N	N	01/13/2018	LANE		1	14			STRGHT			N		N	CLR	S-1STOP	01	NONE	0	STRGHT							013	29,32
CITY							SA	FLORENCE		MN	0	OREGON COAST HY		S	(NONE)		NONE		N	DRY	REAR		PRVTE		S -N						000		00
N							12P	FLORENCE UA		187.80		N MUNSEL LAKE RD		05					N	DAY	INJ		PSNGR	CAR		01	DRVR	NONE	53	F	SUSP	026,052	000		29,32
N							44 0 34.47	-124 6 5.72				000900100S00			(03)																OR>25				
																						02	NONE	0	STOP							
																							PRVTE		S -N						011	013	00
																PSNGR	CAR			01	DRVR	INJC	76	M	OR-Y		000		000		00
																									OR<25						

1 - 21 of 21 Crash records shown.

												03	NONE	0	STOP										
													PRVTE		S -N								022		00
													PSNGR CAR			01	DRVR	INJC	65	M	OR-Y	000	000		00
																					OR<25				
04837	N N N N	12/17/2016	LANE	1 14		ALLEY		N	N	CLR	O-1 L-TURN	01	NONE	0	STRGHT										02
NO RPT		SA	FLORENCE	MN 0	OREGON COAST HY	S	(NONE)	UNKNOWN	N	DRY	TURN		PRVTE		N -S								000		00
N		5P	FLORENCE UA	187.84	N MUNSEL LAKE RD	03			N	DLIT	INJ		PSNGR CAR			01	DRVR	INJC	63	F	OR-Y	000	000		00
N		44 0 32.32	-124 6 5.7		000900100S00		(03)														OR<25				
												01	NONE	0	STRGHT										
													PRVTE		N -S								000		00
													PSNGR CAR			02	PSNG	INJC	26	F		000	000		00
												02	NONE	0	TURN-L										
													PRVTE		S -W								019		00
													PSNGR CAR			01	DRVR	NONE	79	M	OR-Y	028,004	000		02
																					OR<25				
01383	N N N N	04/19/2016	LANE	1 14		ALLEY		N	N	CLR	O-1 L-TURN	01	NONE	9	STRGHT										02
NO RPT		TU	FLORENCE	MN 0	OREGON COAST HY	S	(NONE)	UNKNOWN	N	DRY	TURN		N/A		N -S								000		00
N		11A	FLORENCE UA	187.84	N MUNSEL LAKE RD	03			N	DAY	PDO		PSNGR CAR			01	DRVR	NONE	00	Unk	UNK	000	000		00
N		44 0 32.32	-124 6 5.7		000900100S00		(03)														UNK				
												02	NONE	9	TURN-L										
													N/A		S -W								019		00
													PSNGR CAR			01	DRVR	NONE	00	Unk	UNK	000	000		00
																					UNK				
01554	N N N N	05/30/2018	LANE	1 14		ALLEY		N	Y	RAIN	O-1 L-TURN	01	NONE	9	TURN-L										02
NO RPT		WE	FLORENCE	MN 0	OREGON COAST HY	S	(NONE)	UNKNOWN	N	WET	TURN		N/A		S -W								019		00
N		9A	FLORENCE UA	187.84	N MUNSEL LAKE RD	03			N	DAY	PDO		PSNGR CAR			01	DRVR	NONE	00	Unk	UNK	000	000		00
N		44 0 32.32	-124 6 5.71		000900100S00		(03)														UNK				
												02	NONE	9	STRGHT										
													N/A		N -S								000		00
													PSNGR CAR			01	DRVR	NONE	00	Unk	UNK	000	000		00
																					UNK				
03316	N N N N N N	09/18/2017	LANE	1 14		STRGHT		N	N	CLR	S-STRGHT	01	NONE	0	STRGHT									068	07
NO RPT		MO	FLORENCE	MN 0	OREGON COAST HY	S	(NONE)	NONE	N	DRY	REAR		PRVTE		N -S								000		00
N		6P	FLORENCE UA	187.88	N MUNSEL LAKE RD	04			N	DAY	INJ		PSNGR CAR			01	DRVR	NONE	37	M	OR-Y	016,043	000		07
N		44 0 30.18	-124 6 5.68		000900100S00		(03)														OR<25				
												02	NONE	0	STOP										
													PRVTE		N -S								011	068	00
													PSNGR CAR			01	DRVR	INJC	54	F	OR-Y	000	000		00
																					OR<25				
												02	NONE	0	STOP										
													PRVTE		N -S								011	068	00
													PSNGR CAR			02	PSNG	INJC	09	M		000	000		00
03505	N N N N	10/29/2018	LANE	1 14		STRGHT		N	N	CLR	S-STRGHT	01	NONE	0	STRGHT										29
NO RPT		MO	FLORENCE	MN 0	OREGON COAST HY	N	(NONE)	UNKNOWN	N	DRY	REAR		PRVTE		S -N								000		00
N		6P	FLORENCE UA	187.95	N 46TH ST	05			N	DUSK	INJ		PSNGR CAR			01	DRVR	NONE	19	M	OR-Y	042	000		29
N		44 0 26.44	-124 6 5.65		000900100S00		(03)														OR<25				
												02	NONE	0	STRGHT										
													PRVTE		S -N								000		00

1 - 21 of 21 Crash records shown.

																						PSNGR	CAR			01	DRVR		INJC	45	F	OR-Y OR<25		000		00
01545	N N N N N N	05/01/2016	LANE		1	14			INTER	3-LEG		N	N	CLR	ANGL-OTH	01	NONE	0	TURN-L																02
NO RPT		SU	FLORENCE		MN	0	N 46TH ST		N			NONE	N	DRY	TURN		PRVTE		E -S															018		00
N		5P	FLORENCE UA		188.01		OREGON COAST HY		06	0			Y	DAY	INJ		PSNGR	CAR			01	DRVR		INJB	78	F	OR-Y OR<25		028,007		000		02
N		44 0 23.23	-124 6 5.62				000900100S00																												
																02	NONE	0	STRGHT																	
																	PRVTE		N -S															000		00
																	PSNGR	CAR			01	DRVR		INJC	61	M	OR-Y OR>25		000		000		00
																02	NONE	0	STRGHT																	
																	PRVTE		N -S															000		00
																	PSNGR	CAR			02	PSNG		INJC	13	F			000		000		00
02206	N N N N	06/25/2017	LANE		1	14			INTER	3-LEG		N	N	CLR	O-1 L-TURN	01	NONE	9	STRGHT																02
NO RPT		SU	FLORENCE		MN	0	N 46TH ST		CN			STOP SIGN	N	DRY	TURN		N/A		N -S															000		00
N		9P	FLORENCE UA		188.01		OREGON COAST HY		01	0			N	DARK	PDO		PSNGR	CAR			01	DRVR		NONE	00	Unk	UNK UNK		000		000		00
N		44 0 23.23	-124 6 5.62				000900100S00																												
																02	NONE	9	TURN-L																	
																	N/A		S -W															000		00
																	PSNGR	CAR			01	DRVR		NONE	00	Unk	UNK UNK		000		000		00
02030	N N N N	06/07/2016	LANE		1	14			ALLEY			N	N	CLR	ANGL-OTH	01	NONE	9	STRGHT																02
NO RPT		TU	FLORENCE		MN	0	OREGON COAST HY		S	(NONE)		UNKNOWN	N	DRY	TURN		N/A		N -S															000		00
N		2P	FLORENCE UA		188.06		N 46TH ST		04				N	DAY	PDO		PSNGR	CAR			01	DRVR		NONE	00	Unk	UNK UNK		000		000		00
N		44 0 20.77	-124 6 5.59				000900100S00			(03)																									
																02	NONE	9	TURN-L																	
																	N/A		W -N															018		00
																	PSNGR	CAR			01	DRVR		NONE	00	Unk	UNK UNK		000		000		00
03802	N N N N	11/21/2018	LANE		1	14			ALLEY			N	N	RAIN	ANGL-OTH	01	NONE	9	TURN-L																02
NONE		WE	FLORENCE		MN	0	OREGON COAST HY		S	(NONE)		UNKNOWN	N	WET	TURN		N/A		E -S															018		00
N		9A	FLORENCE UA		188.07		N 46TH ST		05				N	DAY	PDO		PSNGR	CAR			01	DRVR		NONE	00	Unk	UNK UNK		000		000		00
N		44 0 20.31	-124 6 5.59				000900100S00			(03)																									
																02	NONE	9	TURN-L																	
																	N/A		N -E															019		00
																	PSNGR	CAR			01	DRVR		NONE	00	Unk	UNK UNK		000		000		00

Three Mile Prairie Subdivision TIA

Seasonal Factor Calculation

Seasonal Trend Table 2019

	Jan 1	Jan 15	Jan 9	Peak	Factor
Coastal Destination Route	1.3738	1.4039	1.3907	0.6978	**1.9930**
Commuter	1.0577	1.1050	1.0843	0.9438	**1.1489**
					1.5709

Source: 2019 Seasonal Trend Table, ODOT Transportation Development

Growth Rate Calculations

Florence TSP

US 101 @ Munsel Lake Road

	NB Thru	SB Thru	
2035 PM peak hour	755	700	
2009 PM peak hour	465	445	
26 Year Increase	290	255	
			Average
Annual %-Increase	**2.40%**	**2.20%**	**2.30%**

Source: Florence Transportation System Plan, Figs. 4-7 & 4-8

2038 Future Volume Table

Location	MP	2018	2038	RSQ	20 Year Factor	Annual Rate
Florence ATR, Sta. 20-026	186.46	7200	10700	0.9109	1.486	**2.43%**
0.18 mile north of Munsel Lake Road	187.58	8600	8700	0.1589	1.012	**0.06%**
0.03 mile south of Munsel Lake Road	187.79	9500	9600	0.2347	1.011	**0.05%**
					1.169	**0.85%**

	2021	2023	2026
Assumed Annual Growth Rate:	**2.30%**	**2.30%**	**2.30%**
Annual Growth Factor	1.023	1.023	1.023
Years	1	3	6
Growth Factor	**1.023**	**1.069**	**1.138**

Peak Hour Intersection Turning Movement Count & Classification Summary

N/S Street: **Highway 101** | Counted By: **GTD**
E/W Street: **Munsel Lake Road** | Date: **1/9/19**

AM Count

Time Period From-To AM	Northbound Highway 101					Southbound Highway 101					Eastbound Private Drive					Westbound Munsel Lake Road					ALL
	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	
6:30-6:45	0	19	1	**20**	1	1	26	0	**27**	1	0	0	0	**0**	0	3	0	1	**4**	0	51
6:45-7:00	0	21	4	**25**	0	0	35	0	**35**	1	0	0	0	**0**	0	4	0	2	**6**	0	66
Period Total:	0	40	5	**45**	1	1	61	0	**62**	2	0	0	0	**0**	0	7	0	3	**10**	0	117
7:00-7:15	0	24	1	**25**	1	1	40	0	**41**	2	0	0	0	**0**	0	6	0	0	**6**	0	72
7:15-7:30	0	27	3	**30**	1	3	38	0	**41**	1	0	0	0	**0**	0	9	0	5	**14**	0	85
7:30-7:45	0	24	5	**29**	0	8	80	0	**88**	1	0	0	0	**0**	0	7	0	1	**8**	0	125
7:45-8:00	0	32	10	**42**	1	3	83	0	**86**	0	0	0	0	**0**	0	15	0	1	**16**	0	144
Hour Total:	0	107	19	**126**	3	15	241	0	**256**	4	0	0	0	**0**	0	37	0	7	**44**	0	426
8:00-8:15	0	46	8	**54**	2	4	66	0	**70**	1	0	0	0	**0**	0	12	0	5	**17**	0	141
8:15-8:30	0	49	7	**56**	3	8	70	0	**78**	0	0	0	0	**0**	0	9	0	6	**15**	0	149
8:30-8:45	0	54	12	**66**	1	2	76	0	**78**	0	0	0	0	**0**	0	17	0	8	**25**	0	169
8:45-9:00	1	55	9	**65**	0	1	71	0	**72**	0	0	0	0	**0**	0	13	0	6	**19**	0	156
Hour Total:	1	204	36	**241**	6	15	283	0	**298**	1	0	0	0	**0**	0	51	0	25	**76**	0	615
9:00-9:15	0	41	16	**57**	0	7	42	0	**49**	0	0	0	0	**0**	0	10	0	4	**14**	0	120
9:15-9:30	0	42	10	**52**	0	6	35	0	**41**	0	0	0	0	**0**	0	8	0	5	**13**	1	106
Period Total:	0	83	26	**109**	0	13	77	0	**90**	0	0	0	0	**0**	0	18	0	9	**27**	1	226
Grand Total:	1	434	86	**521**	10	44	662	0	**706**	7	0	0	0	**0**	0	113	0	44	**157**	1	1267

PM Count

Time Period From-To PM	Northbound Highway 101					Southbound Highway 101					Eastbound Private Drive					Westbound Munsel Lake Road					ALL
	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	
3:00-3:15	1	92	12	**105**	2	0	98	2	**100**	1	0	3	1	**4**	0	12	1	16	**29**	0	238
3:15-3:30	0	104	23	**127**	1	5	90	1	**96**	0	0	0	0	**0**	0	10	0	2	**12**	0	235
3:30-3:45	1	96	14	**111**	0	5	86	0	**91**	1	0	0	1	**1**	0	14	0	5	**19**	0	222
3:45-4:00	0	94	19	**113**	0	6	106	0	**112**	0	1	0	0	**1**	0	18	0	4	**22**	0	248
Hour Total:	**2**	**386**	**68**	**456**	**3**	**16**	**380**	**3**	**399**	**2**	**1**	**3**	**2**	**6**	**0**	**54**	**1**	**27**	**82**	**0**	**943**
4:00-4:15	1	97	15	**113**	0	3	93	0	**96**	0	0	0	0	**0**	0	8	0	8	**16**	0	225
4:15-4:30	0	82	17	**99**	0	8	84	0	**92**	1	0	0	0	**0**	0	10	1	7	**18**	0	209
4:30-4:45	0	89	19	**108**	1	1	86	0	**87**	1	0	0	1	**1**	0	10	0	6	**16**	1	212
4:45-5:00	0	90	8	**98**	0	5	89	1	**95**	0	0	0	0	**0**	0	15	0	5	**20**	0	213
Hour Total:	1	358	59	**418**	1	17	352	1	**370**	2	0	0	1	**1**	0	43	1	26	**70**	1	859
5:00-5:15	1	85	15	**101**	0	3	75	0	**78**	2	1	0	0	**1**	0	14	0	13	**27**	0	207
5:15-5:30	0	91	16	**107**	0	2	75	0	**77**	0	0	0	1	**1**	0	7	0	5	**12**	0	197
5:30-5:45	0	73	11	**84**	1	11	57	0	**68**	0	0	0	1	**1**	1	11	0	2	**13**	0	166
5:45-6:00	1	65	11	**77**	0	2	62	1	**65**	0	1	0	1	**2**	0	9	0	6	**15**	0	159
Hour Total:	2	314	53	**369**	0	18	269	1	**288**	2	2	0	3	**5**	0	41	0	26	**67**	0	729
Grand Total:	2		180	**182**	4	51	1001	5	**1057**	6	3	3	6	**12**	0	138	2	79	**219**	1	2531
PM Peak Hr. 3:00-4:00	**2**	**386**	**68**	**456**	**3**	**16**	**380**	**3**	**399**	**2**	**1**	**3**	**2**	**6**	**0**	**54**	**1**	**27**	**82**	**0**	**943**
PHF				**0.898**					**0.891**					**0.375**					**0.707**		**0.951**
% Trucks				**1%**					**1%**					**0%**					**0%**		
Seasonal Factor (x 1.57)																					
2019 DHV	**3**	**606**	**107**	**716**		**25**	**597**	**5**	**627**		**2**	**5**	**3**	**10**		**85**	**2**	**42**	**129**		**1482**
Growth Rate (1.023)																					
2020 DHV	**3**	**620**	**109**	**732**		**26**	**611**	**5**	**641**		**2**	**5**	**3**	**10**		**87**	**2**	**43**	**132**		**1516**

Pedestrians

Time period	#	Dir.	#	Dir.
AM:8:15-8:30	1	SB		
PM:3:00-4:00	**2**	**WB**		
PM:4:00-5:00	2	EB		
PM:5:00-6:00	1	WB	1	EB

Bikes

Time period	#	Dir.
	0	

ACCESS ENGINEERING

Peak Hour Intersection Turning Movement Count & Classification Summary

N/S Street: **Highway 101** Counted By: **GTD**

E/W Street: **Fred Meyer Driveway** Date: **1/9/19**

AM Count

Time Period From-To AM	Northbound Highway 101					Southbound Highway 101					Eastbound Fred Meyer Driveway					Westbound					ALL
	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	
6:30-6:45	0	23		**23**	1		30	1	**31**	1	1		0	**1**	0				**0**		55
6:45-7:00	1	28		**29**	0		32	7	**39**	1	0		1	**1**	0				**0**		69
Period Total:	1	51	0	**52**	1	0	62	8	**70**	2	1	0	1	**2**	0	0	0	0	**0**	0	124
7:00-7:15	6	18		**24**	1		41	4	**45**	2	0		1	**1**	0				**0**		70
7:15-7:30	3	32		**35**	1		38	11	**49**	1	5		3	**8**	0				**0**		92
7:30-7:45	2	26		**28**	0		78	3	**81**	1	3		3	**6**	0				**0**		115
7:45-8:00	4	38		**42**	1		87	11	**98**	0	6		6	**12**	0				**0**		152
Hour Total:	15	114	0	**129**	3	0	244	29	**273**	4	14	0	13	**27**	0	0	0	0	**0**	0	429
8:00-8:15	10	44		**54**	2		72	9	**81**	1	6		5	**11**	0				**0**		146
8:15-8:30	10	45		**55**	3		68	10	**78**	0	9		8	**17**	0				**0**		150
8:30-8:45	9	60		**69**	1		76	17	**93**	0	15		7	**22**	0				**0**		184
8:45-9:00	15	54		**69**	2		72	11	**83**	0	8		10	**18**	0				**0**		170
Hour Total:	44	203	0	**247**	8	0	288	47	**335**	1	38	0	30	**68**	0	0	0	0	**0**	0	650
9:00-9:15	4	48		**52**	0		44	8	**52**	0	5		13	**18**	0				**0**		122
9:15-9:30	10	47		**57**	0		38	6	**44**	1	9		4	**13**	0				**0**		114
Period Total:	14	95	0	**109**	0	0	82	14	**96**	1	14	0	17	**31**	0	0	0	0	**0**	0	236
Grand Total:	74	463	0	**537**	12	0	676	98	**774**	8	67	0	61	**128**	0	0	0	0	**0**	0	1315

PM Count

Time Period From-To PM	Northbound Highway 101					Southbound Highway 101					Eastbound Fred Meyer Driveway					Westbound					ALL
	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	
3:00-3:15	18	101		**119**	2		88	22	**110**	1	27		13	**40**	0				**0**		269
3:15-3:30	13	104		**117**	1		83	17	**100**	0	19		7	**26**	0				**0**		243
3:30-3:45	10	88		**98**	0		104	21	**125**	1	33		13	**46**	0				**0**		269
3:45-4:00	10	92		**102**	0		103	20	**123**	0	18		15	**33**	0				**0**		258
Hour Total:	**51**	**385**	**0**	**436**	**3**	**0**	**378**	**80**	**458**	**2**	**97**	**0**	**48**	**145**	**0**	**0**	**0**	**0**	**0**	**0**	**1039**
4:00-4:15	18	89		**107**	1		81	22	**103**	0	20		15	**35**	0				**0**		245
4:15-4:30	17	71		**88**	0		74	20	**94**	1	30		12	**42**	0				**0**		224
4:30-4:45	11	88		**99**	1		81	15	**96**	1	26		11	**37**	0				**0**		232
4:45-5:00	16	76		**92**	0		90	15	**105**	0	23		14	**37**	0				**0**		234
Hour Total:	62	324	0	**386**	2	0	326	72	**398**	2	99	0	52	**151**	0	0	0	0	**0**	0	935
5:00-5:15	16	84		**100**	0		72	17	**89**	2	21		12	**33**	0				**0**		222
5:15-5:30	12	83		**95**	0		67	12	**79**	0	22		7	**29**	0				**0**		203
5:30-5:45	5	72		**77**	1		51	17	**68**	0	17		10	**27**	0				**0**		172
5:45-6:00	10	68		**78**	0		62	9	**71**	0	14		7	**21**	0				**0**		170
Hour Total:	43	307	0	**350**	0	0	252	55	**307**	2	74	0	36	**110**	0	0	0	0	**0**	0	767
Grand Total:	60	1016	0	**1076**	5	0	956	207	**1163**	6	270	0	136	**406**	0	0	0	0	**0**	0	2741
PM Peak Hr. 3:00-4:00	**51**	**385**	**0**	**436**	**3**	**0**	**378**	**80**	**458**	**2**	**97**	**0**	**48**	**145**	**0**	**0**	**0**	**0**	**0**	**0**	**1039**
PHF				**0.916**					**0.916**					**0.788**					**N/A**		**0.966**
% Trucks				**1%**					**0%**					**0%**							
Seasonal Factor (x 1.570)																					
2019 DHV	**80**	**604**	**0**	**684**		**0**	**593**	**126**	**719**		**152**	**0**	**75**	**227**		**0**	**0**	**0**	**0**		**1630**
Growth Rate (1.023)																					
2020 DHV	**82**	**618**	**0**	**700**		**0**	**607**	**129**	**736**		**155**	**0**	**77**	**232**		**0**	**0**	**0**	**0**		**1667**

Pedestrians

Time period	#	Dir.	#	Dir.
PM:4:00-5:00	2	EB		
PM:5:00-6:00	1	EB		

Bikes

Time period	#	Dir.
	0	

ACCESS ENGINEERING

Peak Hour Intersection Turning Movement Count & Classification Summary

N/S Street: **Highway 101** | Counted By: **GTD**
E/W Street: **46th Street** | Date: **1/9/19**

AM Count

Time Period From-To AM	Northbound Highway 101					Southbound Highway 101					Eastbound 46th Street					Westbound Private Drive					ALL
	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	
6:30-6:45	3	23	2	**28**	1	2	28	1	**31**	1	0	0	2	**2**	1	0	0	0	**0**	0	61
6:45-7:00	7	28	4	**39**	0	2	31	0	**33**	1	1	1	2	**4**	0	0	0	0	**0**	0	76
Period Total:	10	51	6	**67**	1	4	59	1	**64**	2	1	1	4	**6**	1	0	0	0	**0**	0	137
7:00-7:15	8	24	0	**32**	1	0	42	0	**42**	2	0	0	3	**3**	0	0	0	0	**0**	0	77
7:15-7:30	3	35	0	**38**	1	0	41	1	**42**	1	0	0	11	**11**	0	0	0	0	**0**	0	91
7:30-7:45	10	27	0	**37**	0	0	81	2	**83**	1	1	0	6	**7**	1	0	0	0	**0**	0	127
7:45-8:00	11	42	0	**53**	1	0	90	3	**93**	0	0	0	10	**10**	0	0	0	0	**0**	0	156
Hour Total:	32	128	0	**160**	3	0	254	6	**260**	4	1	0	30	**31**	1	0	0	0	**0**	0	451
8:00-8:15	11	52	0	**63**	2	0	77	2	**79**	1	2	0	13	**15**	0	0	0	0	**0**	0	157
8:15-8:30	14	53	0	**67**	4	0	75	1	**76**	0	2	0	13	**15**	0	0	0	0	**0**	0	158
8:30-8:45	22	69	0	**91**	1	0	80	3	**83**	0	1	0	14	**15**	0	2	2	1	**5**	0	194
8:45-9:00	15	67	0	**82**	2	0	81	1	**82**	0	4	0	15	**19**	1	2	0	2	**4**	0	187
Hour Total:	62	241	0	**303**	9	0	313	7	**320**	1	9	0	55	**64**	1	4	2	3	**9**	0	696
9:00-9:15	7	51	0	**58**	0	0	57	0	**57**	0	2	0	15	**17**	0	2	0	1	**3**	0	135
9:15-9:30	15	56	0	**71**	0	0	42	3	**45**	1	1	0	18	**19**	0	0	0	0	**0**	0	135
Period Total:	22	107	0	**129**	0	0	99	3	**102**	1	3	0	33	**36**	0	2	0	1	**3**	0	270
Grand Total:	126	527	6	**659**	13	4	725	17	**746**	8	14	1	122	**137**	3	6	2	4	**12**	0	1417
PM Peak Hr. 8:00-9:00	**62**	**241**	**0**	**303**	**9**	**0**	**313**	**7**	**320**	**1**	**9**	**0**	**55**	**64**	**1**	**4**	**2**	**3**	**9**	**0**	**696**
PHF				**0.832**					**0.964**					**0.842**					**0.450**		**0.897**
% Trucks				**3%**					**0%**					**2%**					**0%**		

PM Count

Time Period From-To PM	Northbound Highway 101					Southbound Highway 101					Eastbound 46th Street					Westbound Private Drive					ALL
	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	Left	Thru	Right	Total	Trucks	
3:00-3:15	33	115	0	**148**	2	0	100	3	**103**	1	4	0	29	**33**	1	1	0	0	**1**	0	285
3:15-3:30	33	109	0	**142**	2	0	88	2	**90**	0	8	0	31	**39**	0	0	0	0	**0**	0	271
3:30-3:45	29	98	0	**127**	0	0	114	3	**117**	1	0	0	32	**32**	0	1	0	0	**1**	0	277
3:45-4:00	33	100	0	**133**	0	0	112	6	**118**	0	2	0	26	**28**	0	0	0	0	**0**	0	279
Hour Total:	128	422	0	**550**	4	0	414	14	**428**	2	14	0	118	**132**	1	2	0	0	**2**	0	1112
4:00-4:15	29	103	0	**132**	1	0	95	2	**97**	0	4	0	27	**31**	0	2	0	0	**2**	0	262
4:15-4:30	22	87	0	**109**	1	0	80	6	**86**	1	1	0	33	**34**	1	0	0	0	**0**	0	229
4:30-4:45	16	96	0	**112**	1	0	89	4	**93**	1	3	0	24	**27**	0	0	0	0	**0**	1	232
4:45-5:00	20	87	0	**107**	0	0	100	3	**103**	0	6	0	25	**31**	0	0	0	0	**0**	0	241
Hour Total:	87	373	0	**460**	3	0	364	15	**379**	2	14	0	109	**123**	1	2	0	0	**2**	1	964
5:00-5:15	30	99	0	**129**	0	0	79	5	**84**	2	1	0	32	**33**	0	0	0	0	**0**	0	246
5:15-5:30	20	91	0	**111**	0	0	71	3	**74**	0	4	0	22	**26**	0	0	0	0	**0**	0	211
5:30-5:45	17	73	0	**90**	1	0	59	2	**61**	0	4	0	30	**34**	0	0	0	0	**0**	0	185
5:45-6:00	19	74	0	**93**	0	0	65	4	**69**	0	4	0	12	**16**	0	0	0	0	**0**	0	178
Hour Total:	86	337	0	**423**	0	0	274	14	**288**	2	13	0	96	**109**	0	0	0	0	**0**	0	820
Grand Total:	108		0	**108**	7	0	1052	43	**1095**	6	41	0	323	**364**	2	0	0	0	**0**	1	2896
PM Peak Hr. 3:00-4:00	**128**	**422**	**0**	**550**	**4**	**0**	**414**	**14**	**428**	**2**	**14**	**0**	**118**	**132**	**1**	**2**	**0**	**0**	**2**	**0**	**1112**
PHF				**0.929**					**0.907**					**0.846**					**0.500**		**0.975**
% Trucks				**1%**					**0%**					**1%**					**0%**		
Seasonal Factor (x 1.570)																					
2019 DHV	**201**	**663**	**0**	**864**		**0**	**650**	**22**	**672**		**22**	**0**	**185**	**207**		**3**	**0**	**0**	**3**		**1746**
Growth Rate (1.023)																					
2020 DHV	**206**	**678**	**0**	**884**		**0**	**665**	**23**	**687**		**23**	**0**	**189**	**212**		**3**	**0**	**0**	**3**		**1786**

Pedestrians

Time period	#	Dir.	#	Dir.
AM:8:00-9:00	1	EB	1	NB
PM:3:00-4:00	3	EB		
PM:4:00-5:00	1	EB		
PM:5:00-6:00	1	EB		

Bikes

Time period	#	Dir.

Location	US101; MP 186.46; OREGON COAST HIGHWAY NO. 9; 0.77 mile north of Heceta Beach Rd	Site Name	Florence (20-026)
		Installed	July, 2010

HISTORICAL ANNUAL TRAFFIC DATA

Year	Annual Average Daily Traffic (AADT)	Critical Values as percent of Annual Average Daily Traffic (AADT)				
		Max Day	Max Hour	10th Hour	20th Hour	30th Hour
2010	***	***	***	***	***	***
2011	6229	158	15.7	14.9	14.3	14.0
2012	6122	155	15.0	14.1	13.6	13.3
2013	6237	164	16.4	15.0	14.3	13.9
2014	6387	160	15.5	15.0	14.6	14.3
2015	6839	176	16.7	15.5	14.8	14.3
2016	6963	177	17.0	15.4	14.6	14.3
2017	7110	189	20.3	16.9	15.7	15.2
2018	7189	157	16.2	14.9	14.5	14.2
2019	7224	163	15.9	14.6	14.3	13.9

19 SEASONAL TRAFFIC DA

Month	Weekday		Daily	
	Average	% AADT	Average	% AADT
January	5604	78	5648	78
February	5341	74	5328	74
March	6535	90	6863	95
April	6539	91	6605	91
May	7070	98	7472	103
June	8259	114	8500	118
July	9407	130	9831	136
August	9445	131	9744	135
Septembe	7992	111	8119	112
October	6671	92	6852	95
Novembe	5992	83	6124	85
Decembe	5665	78	5596	77

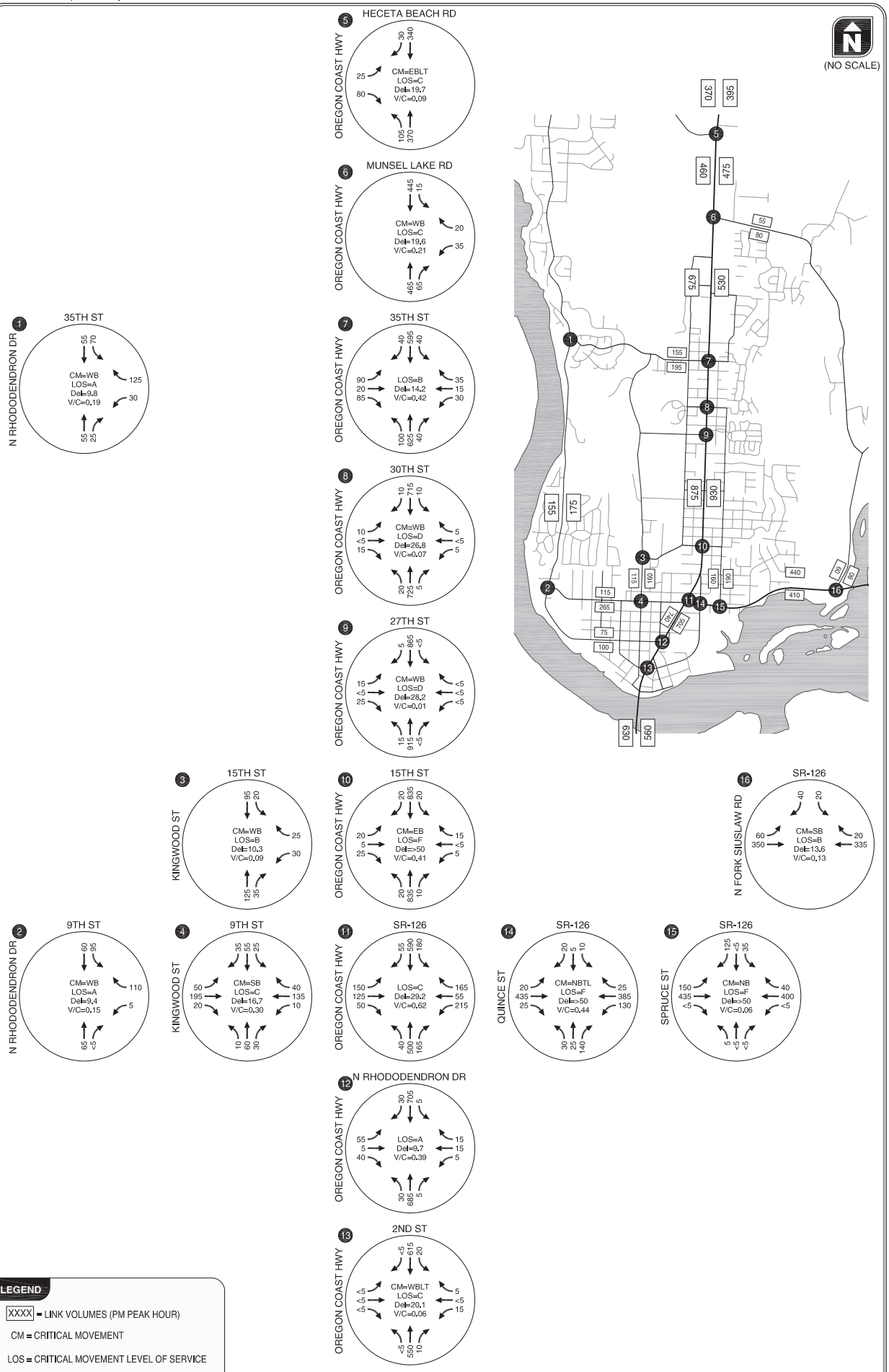
Location	OR126; MP 8.66; EUGENE-SPRINGFIELD HIGHWAY NO. 227; 0.39 mile north of 52nd St	Site Name	East Springfield (20-027)
		Installed	July, 2010

HISTORICAL ANNUAL TRAFFIC DATA

Year	Annual Average Daily Traffic (AADT)	Critical Values as percent of Annual Average Daily Traffic (AADT)				
		Max Day	Max Hour	10th Hour	20th Hour	30th Hour
2010	***	***	***	***	***	***

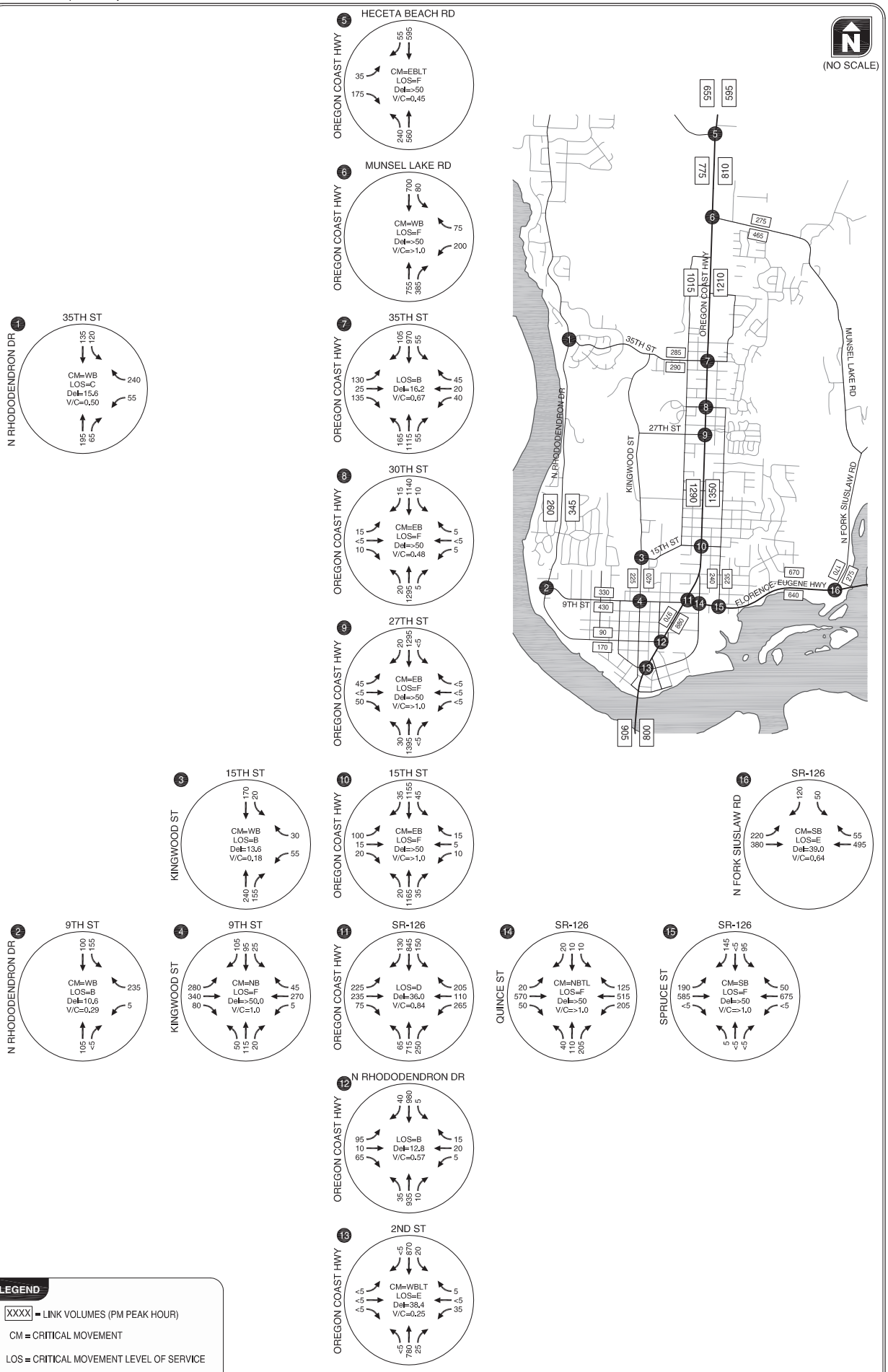
19 SEASONAL TRAFFIC DA

Month	Weekday		Daily	
	Average	% AADT	Average	% AADT
January	33056	99	31308	93
February	28930	86	28657	85
March	34744	104	32709	98



EXISTING TRAFFIC OPERATIONS
WEEKDAY PM PEAK HOUR
FLORENCE, OREGON

FIGURE 4-7



LEGEND

- XXXX = LINK VOLUMES (PM PEAK HOUR)
- CM = CRITICAL MOVEMENT
- LOS = CRITICAL MOVEMENT LEVEL OF SERVICE
- Del = CRITICAL MOVEMENT CONTROL DELAY
- V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2035 NO-BUILD TRAFFIC OPERATIONS
WEEKDAY PM PEAK HOUR
FLORENCE, OREGON

FIGURE 4-8

H:\proj\file\10103 - Florence TGM Grant Application\dwgs\figs\TSP figures\10103_fig_TSP_Chapter 4.dwg Feb 25, 2013 - 6:47pm - darguea Layout Tab: Fig4-8

Single-Family Detached Housing
(210)

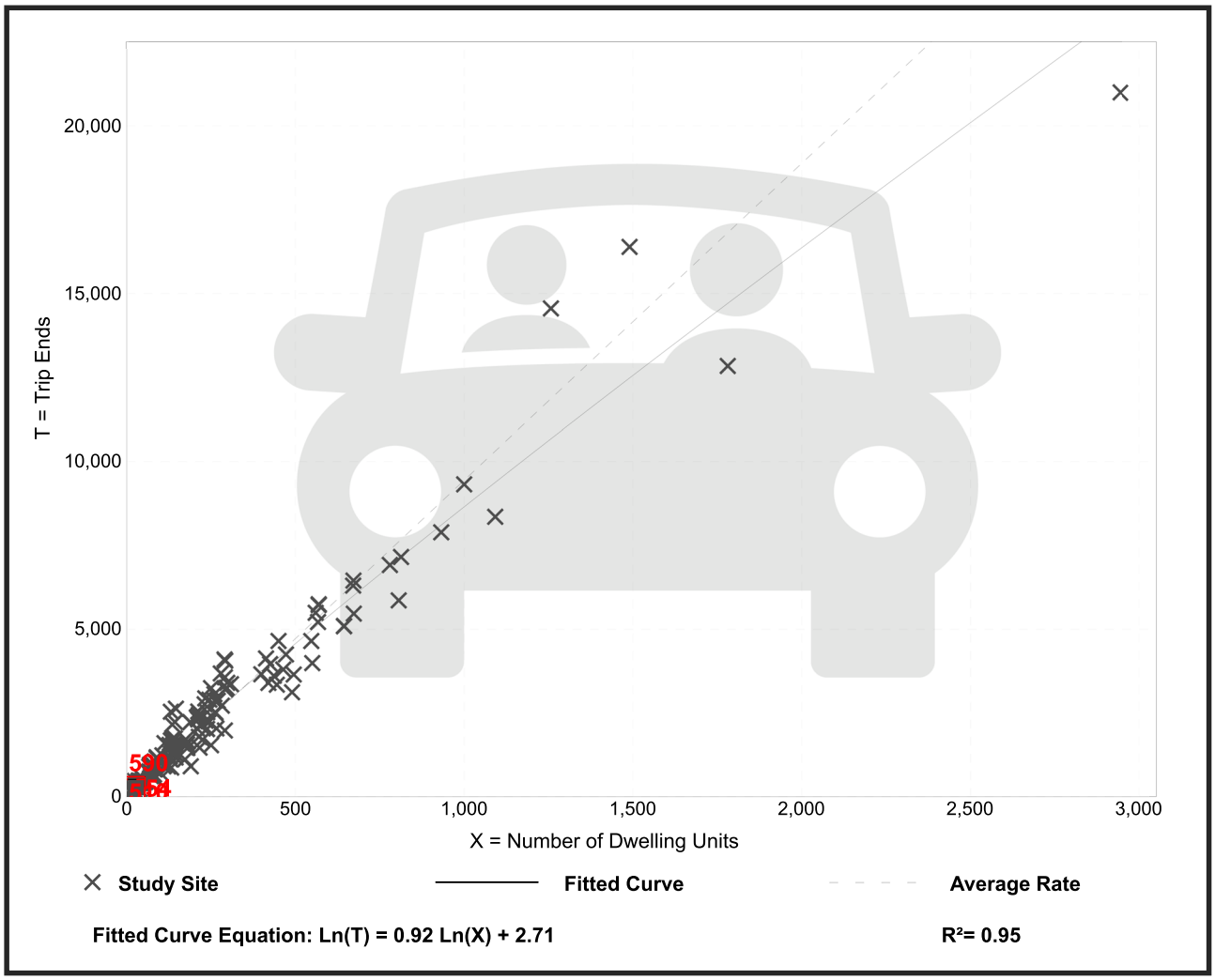
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Trip Gen Manual, 10th Ed + Supplement • Institute of Transportation Engineers

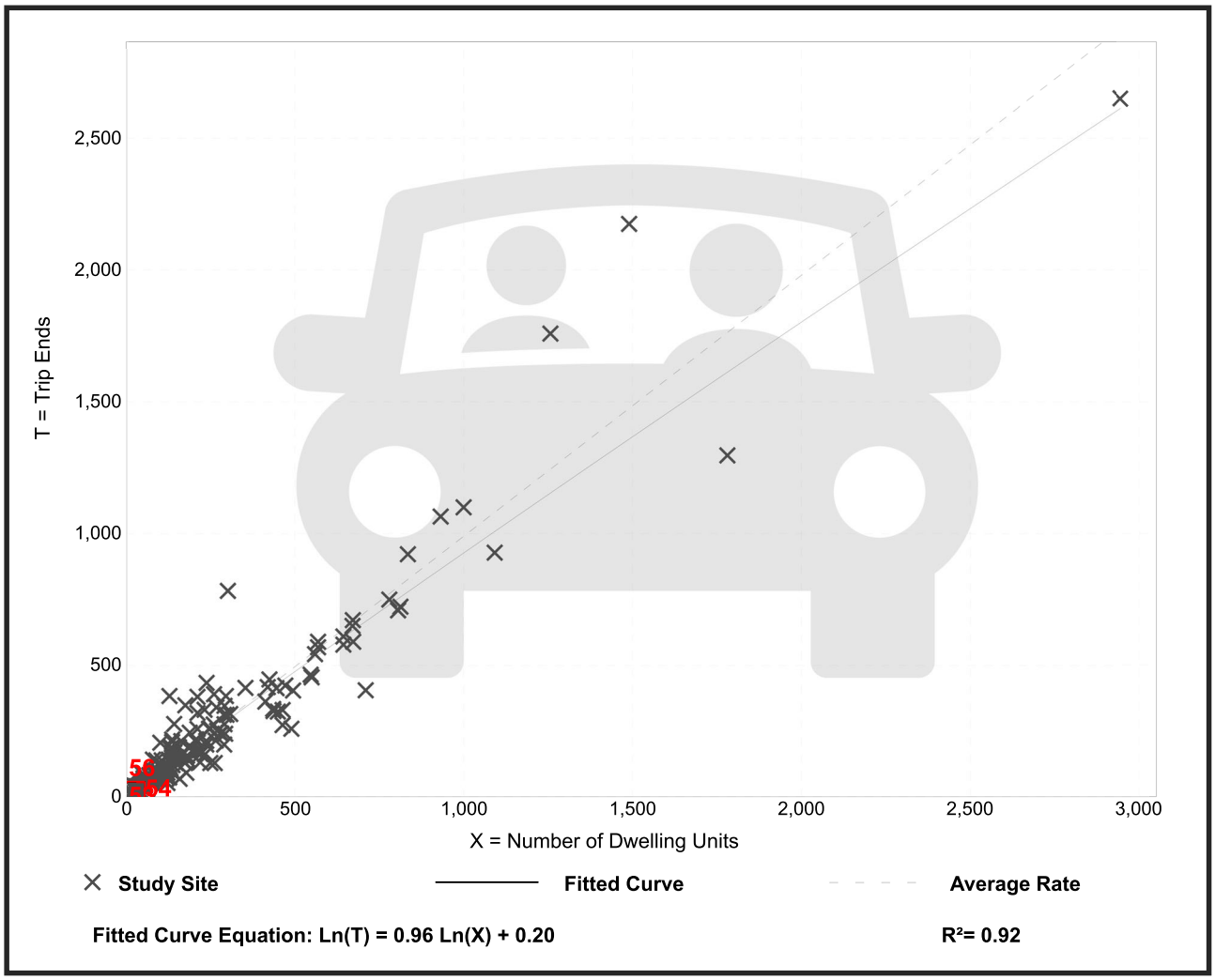
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 190
Avg. Num. of Dwelling Units: 242
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



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Single-Family Detached Housing
(210)

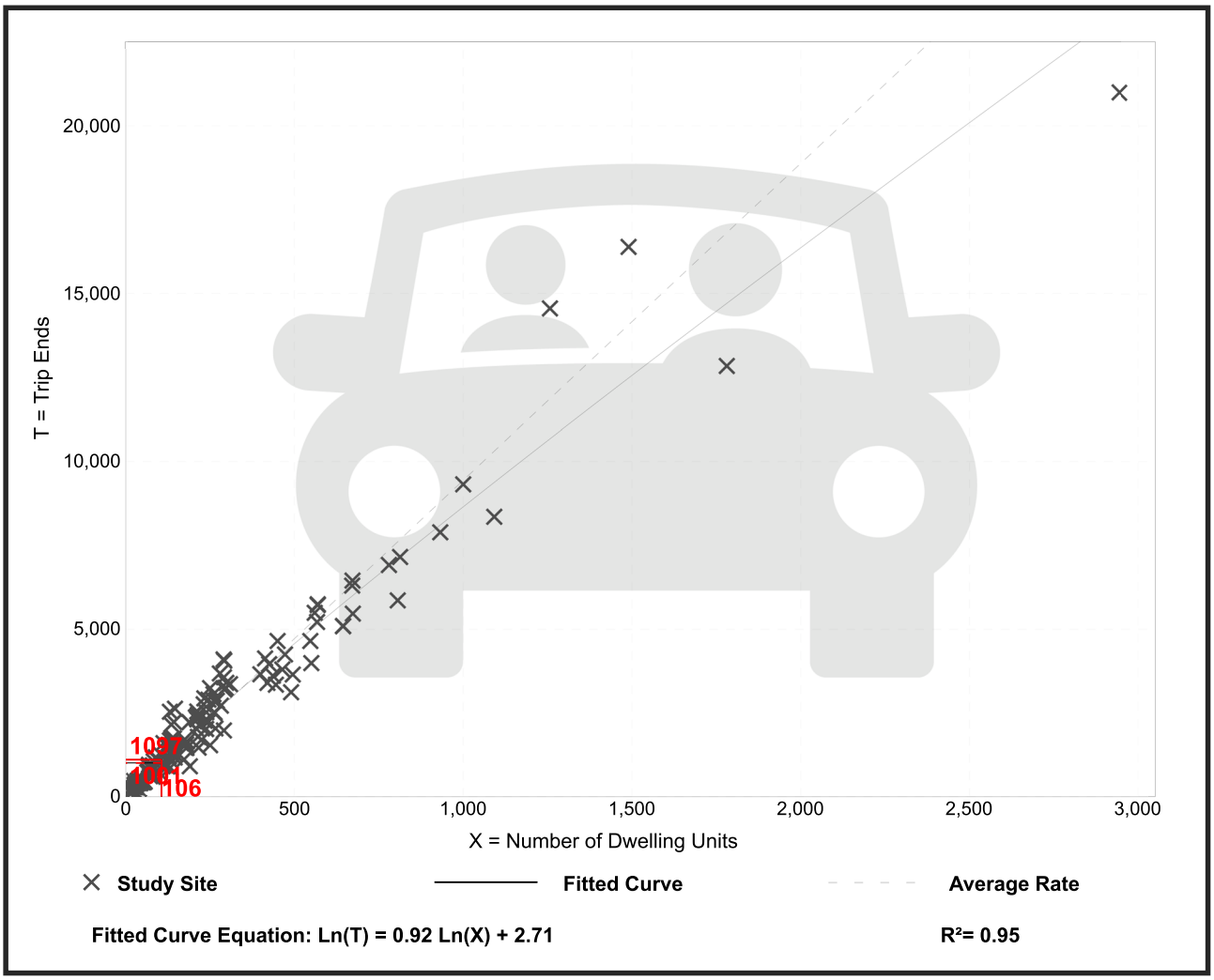
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



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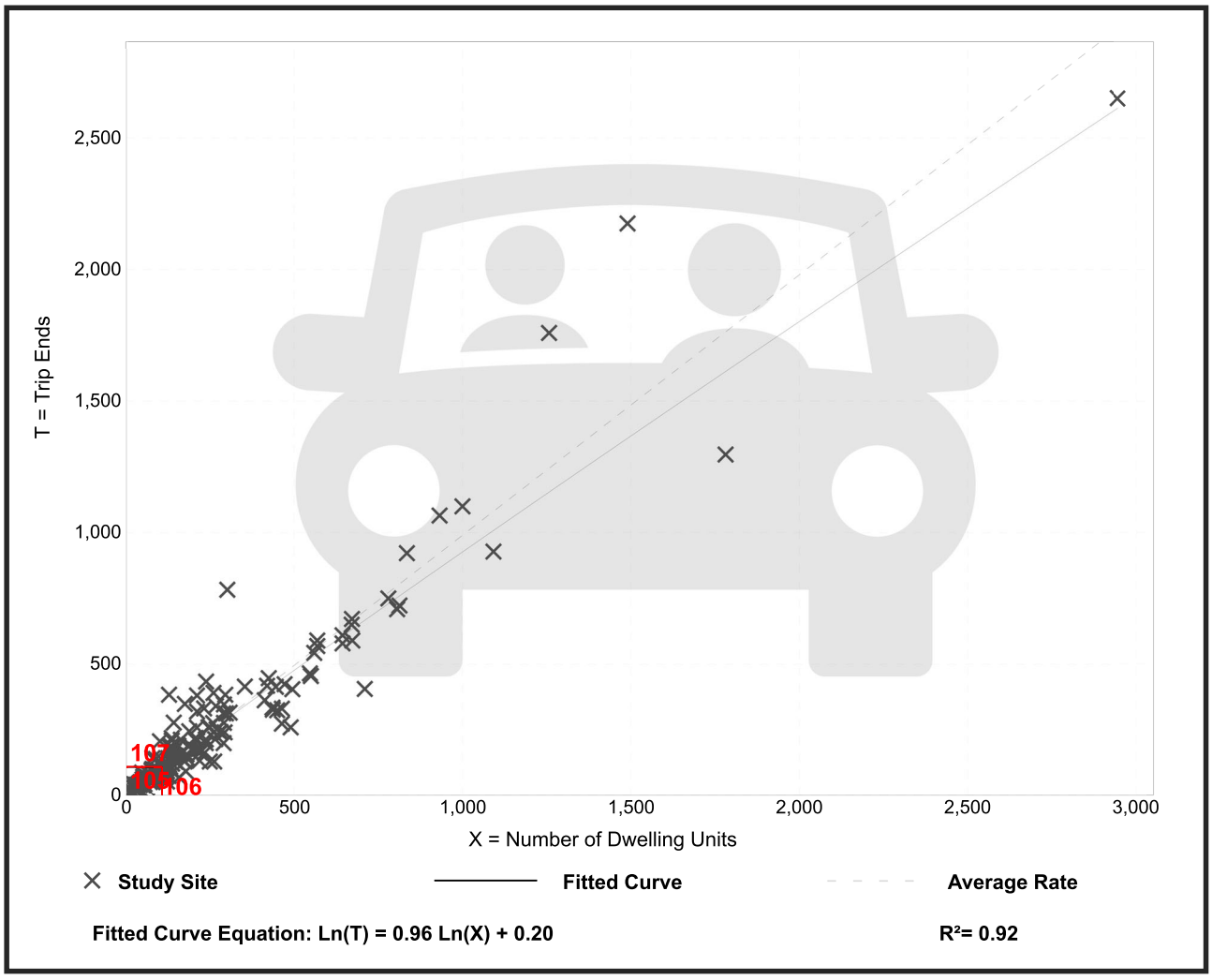
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 190
Avg. Num. of Dwelling Units: 242
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



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Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
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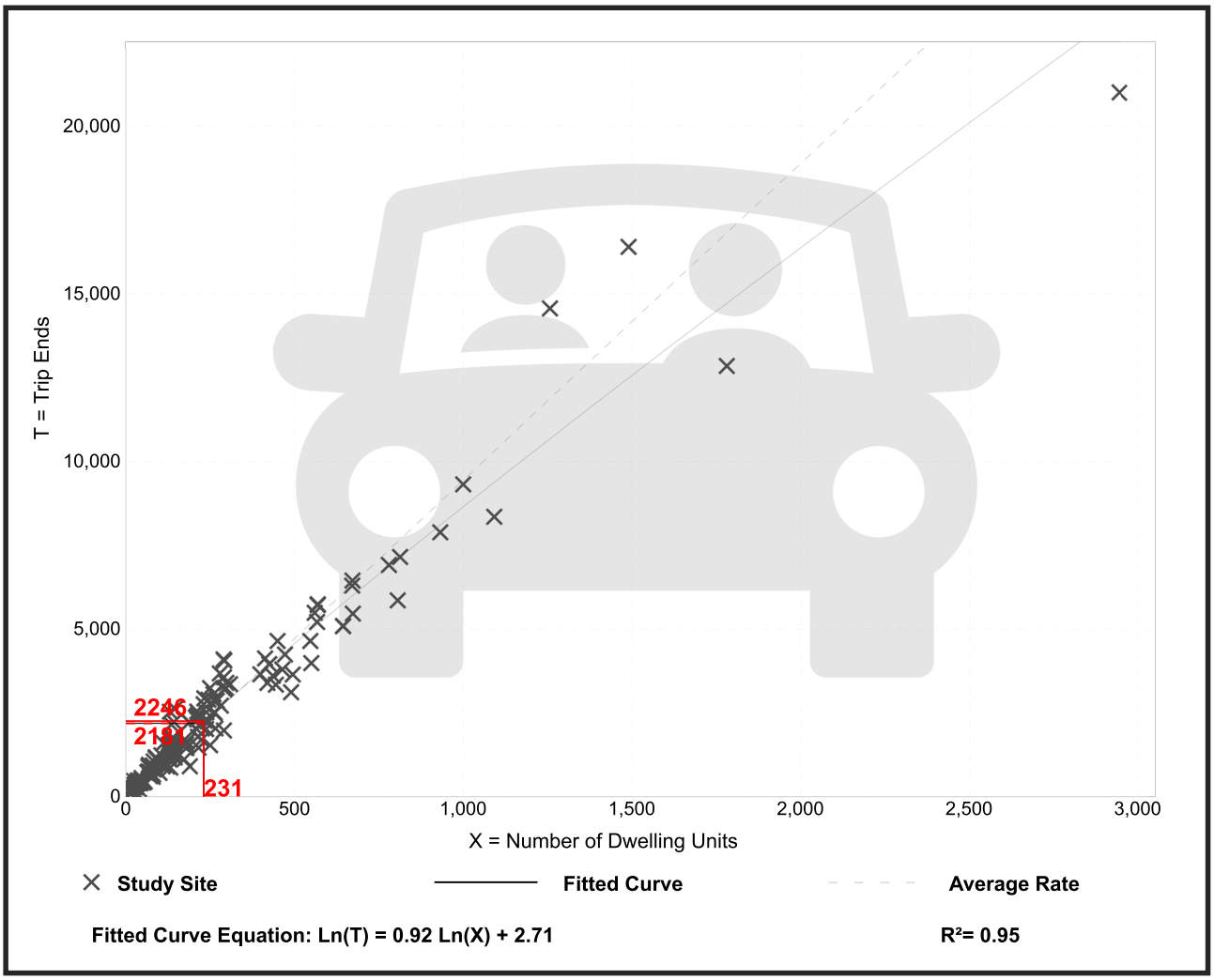
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Trip Gen Manual, 10th Ed + Supplement • Institute of Transportation Engineers

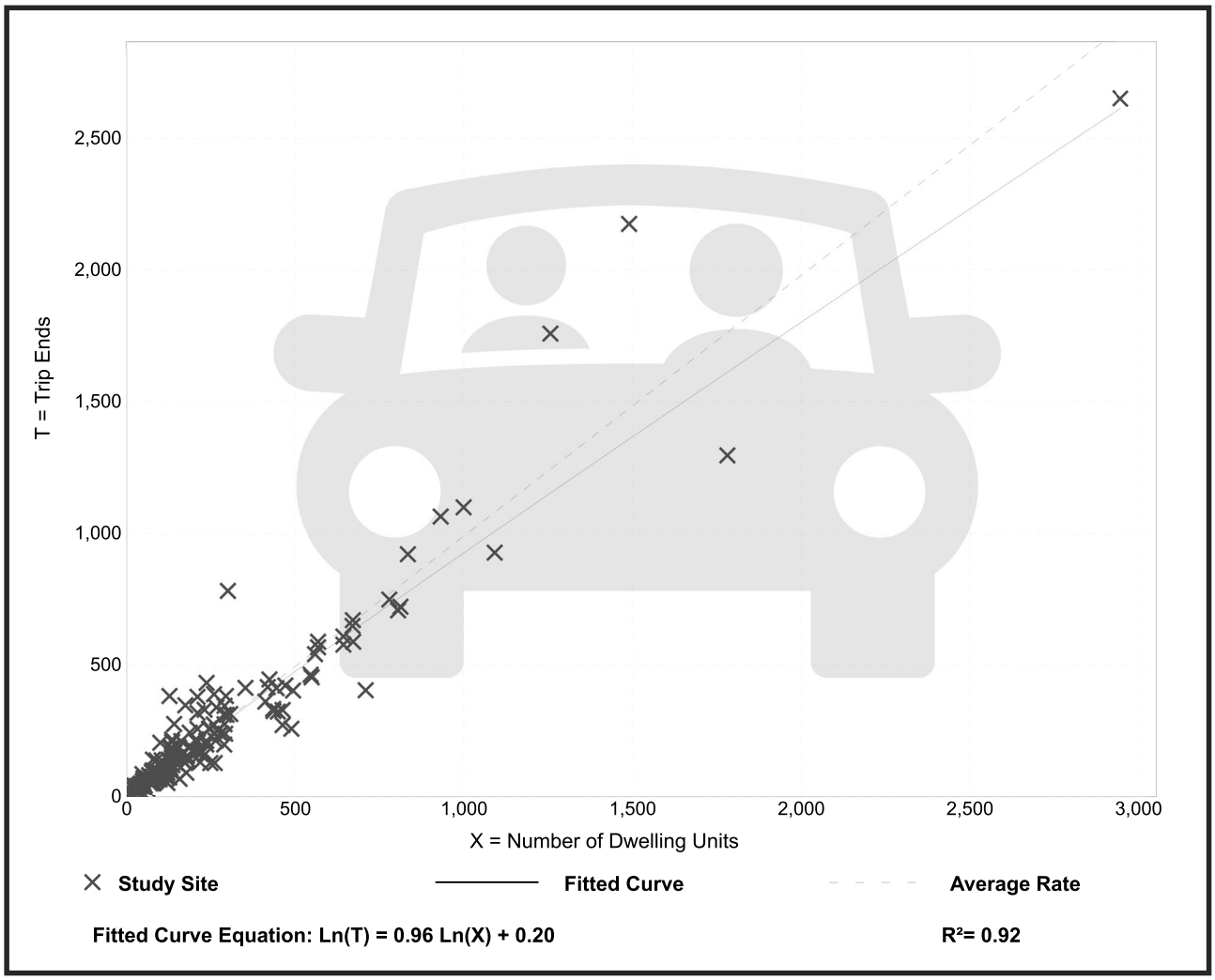
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	190
Avg. Num. of Dwelling Units:	242
Directional Distribution:	63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



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2.0 PROPOSED SITE USAGE

The site will be completed in multiple phases. The evaluation considers traffic levels for the year 2021 when the southern half has been completed and traffic levels for the year 2028 when the final phases are completed. The construction of 47th Street to Highway 101 is anticipated at the first phase to be completed in year 2020. During this phase the only access to the site will be from 47th Street, this will be the only access until the final phases extend Redwood Street to Munsel Lake Road.

The phasing plan for Cannery Station is detailed below. Each of the phases will include flexible commercial space that can be used for retail, restaurant, and office space.

Development levels at year 2021:

- Commercial- 9,123 square feet
- Assisted Living - 78 units
- Apartments - 52 units

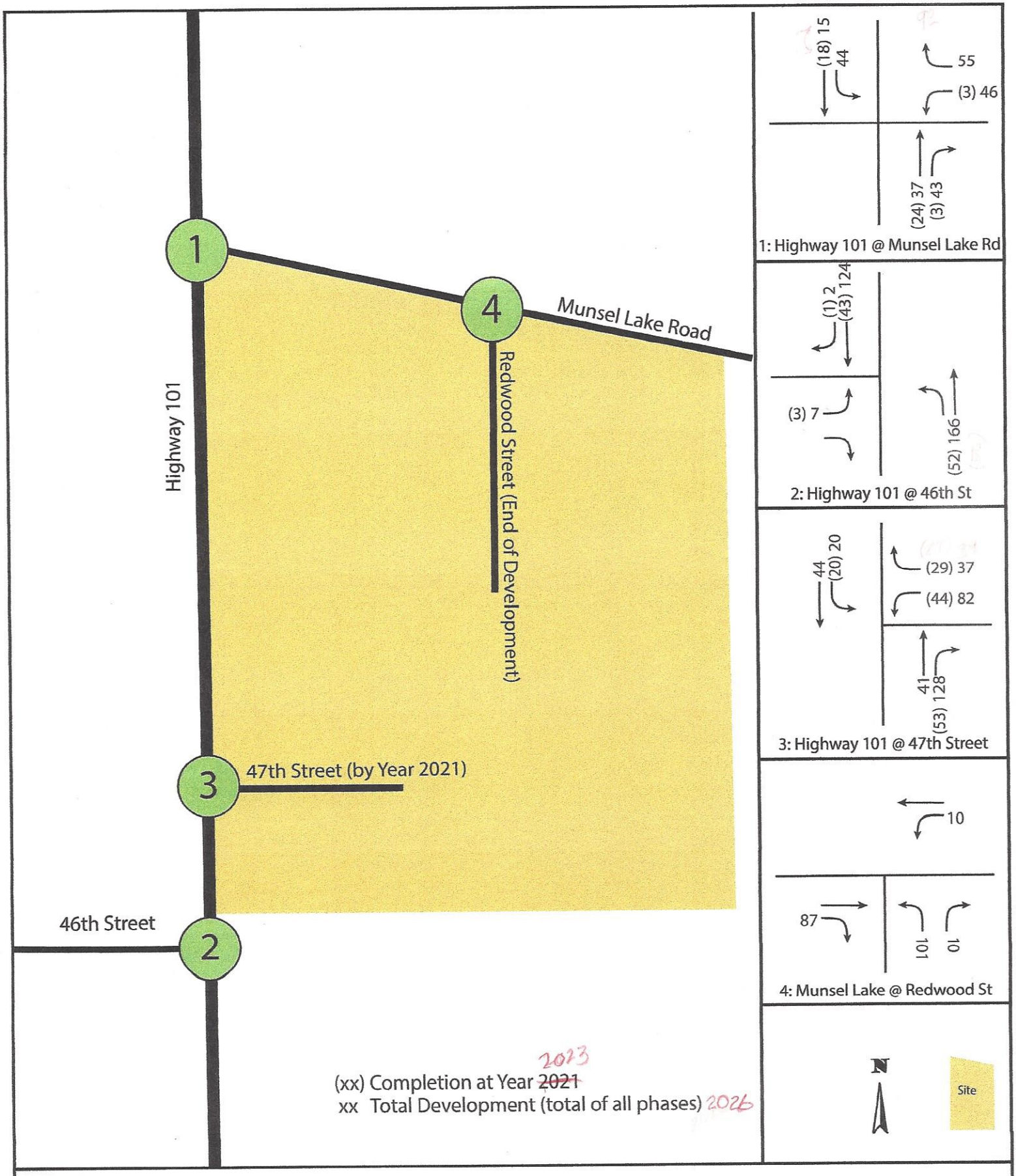
Development levels between year 2021 at year 2028

- Commercial - 37,908 square feet
- Multi-Family Housing - 58 units
- Mid-Rise Apartments – 50 units

2.1 TRIP GENERATION

The trips generated to the site are estimated using information contained in the *ITE Trip Generation Manual 10th Edition*. The vehicle trips generated to the site are illustrated in Table 1. The commercial space uses the ITE Land Use Code 820 for Shopping Center. There is no longer a land use code for specialty retail in the 10th edition, all flexible retail space is included within the 820-Shopping center land use.

The second group of Phases was calculated assuming some of the buildings in lots 10, 11, or 12 will be constructed as restaurant. The restaurant trip generation is higher than shopping center. Using the restaurant trip generation rate was done to allow maximum flexibility for the second group of phases.



Cannery Station Florence, Oregon

Figure 2: PM Peak Hour Trip Distribution

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160 Madison Street Suite A Eugene, Oregon 97402 - 541.513.3376 - sandowengineering.com

Munsel Lake Road K30 Computation

e/o Highway 101

No Build

Year	ADT	PH	K30
2018	2100		
2019	2148	261	8.23

Highway 101 K30 - from ATR

n/o Munsel Lake Road

No Build

Year	PH	K30	ADT
2019	1223	13.9	17000

Critical Movement Calculations

Highway 101 @ Munsel Lake Road

Build Three Mile Prairie

Critical Movements	WBL	NBT	NBL
Adj Flow Rate, veh/h	101	793	52
Sat. Flow, veh/h	1132	1735	1667
Flow Ratios	0.089	0.457	0.031
Sum of Flow Ratios		0.55	
CL/(CL-LT)		1.22	
Xc		**0.66**	

Build Cannery Station

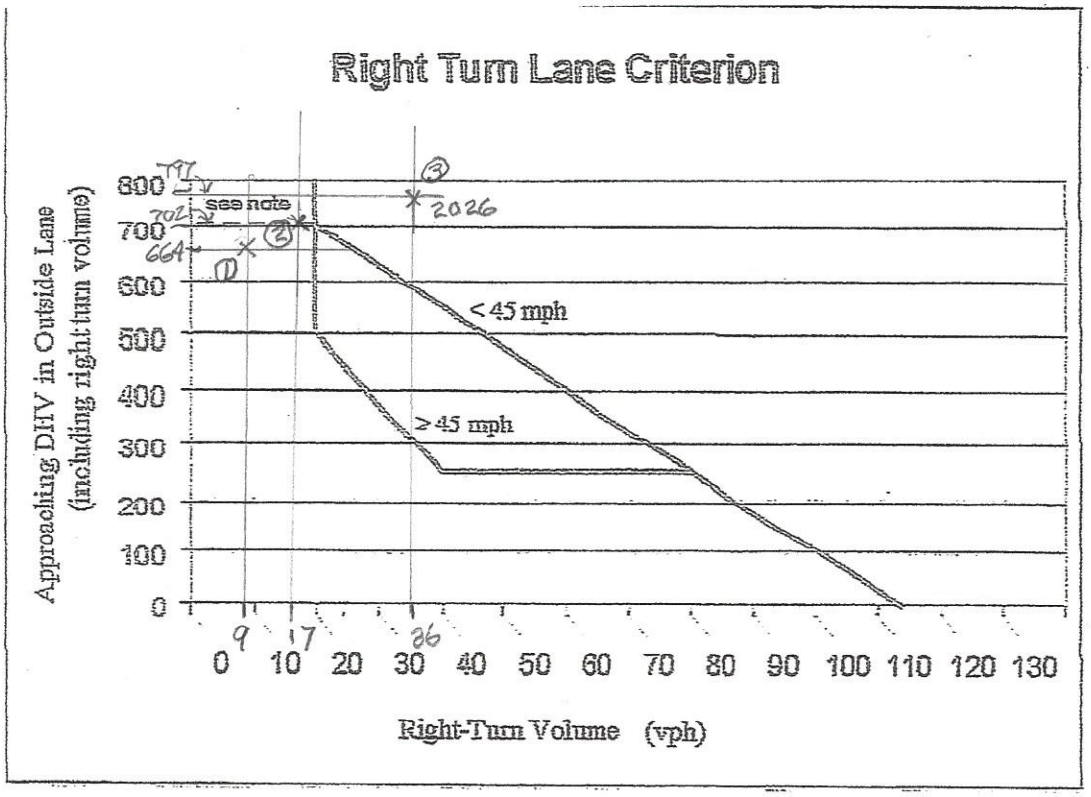
Critical Movements	WBL	NBT	SBL
Adj Flow Rate, veh/h	149	781	78
Sat. Flow, veh/h	1427	1667	1733
Flow Ratios	0.104	0.469	0.045
Sum of Flow Ratios		0.62	
CL/(CL-LT)		1.22	
Xc		**0.75**	

Build Three Mile Prairie + Cannery Station

Critical Movements	WBL	NBT	SBL
Adj Flow Rate, veh/h	149	832	80
Sat. Flow, veh/h	1396	1388	1733
Flow Ratios	0.107	0.599	0.046
Sum of Flow Ratios		0.75	
CL/(CL-LT)		1.22	
Xc		**0.91**	

Build Three Mile Prairie + Cannery Station
Add NB Right Turn Lane

Critical Movements	WBL	NBT	SBL
Adj Flow Rate, veh/h	149	832	80
Sat. Flow, veh/h	1396	1733	1733
Flow Ratios	0.107	0.480	0.046
Sum of Flow Ratios		0.63	
CL/(CL-LT)		1.22	
Xc		**0.77**	



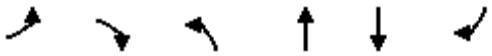
Note: If there is no right turn lane, a shoulder needs to be provided. If this intersection is in a rural area and is a connection to a public street, a right turn lane is needed.

① Phase 1
② Phase 2
③ All Phases

Appendix C

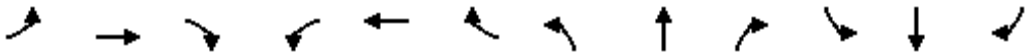
2021 Synchro & SimTraffic Reports

Preliminary Signal Warrants



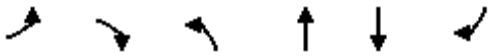
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	665	655	0
Future Volume (vph)	0	0	0	665	655	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	25			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1750	0	1983	1733	1733	0
Flt Permitted						
Satd. Flow (perm)	1750	0	1983	1733	1733	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	355			890	973	
Travel Time (s)	9.7			15.2	16.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	0	0	0	700	689	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	700	689	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	41.3%	ICU Level of Service	A
Analysis Period (min)	15		



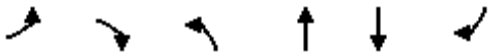
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	5	3	85	2	45	5	620	110	25	625	5
Future Volume (vph)	2	5	3	85	2	45	5	620	110	25	625	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	16	12	12	16	12	12
Storage Length (ft)	0		0	0		50	25		0	100		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.959			0.954			0.977			0.999	
Flt Protected		0.990			0.969		0.950			0.950		
Satd. Flow (prot)	0	1661	0	0	1618	0	1884	1695	0	1884	1731	0
Flt Permitted		0.990			0.969		0.950			0.950		
Satd. Flow (perm)	0	1661	0	0	1618	0	1884	1695	0	1884	1731	0
Link Speed (mph)		30			35			40			40	
Link Distance (ft)		240			680			460			890	
Travel Time (s)		5.5			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	2	5	3	89	2	47	5	653	116	26	658	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	0	0	138	0	5	769	0	26	663	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 64.2%		ICU Level of Service C	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	155	75	80	620	605	120
Future Volume (vph)	155	75	80	620	605	120
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	50	0	25			75
Storage Lanes	1	1	1			1
Taper Length (ft)	50		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	20			40	40	
Link Distance (ft)	261			910	460	
Travel Time (s)	8.9			15.5	7.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	160	77	82	639	624	124
Shared Lane Traffic (%)						
Lane Group Flow (vph)	160	77	82	639	624	124
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 51.4%		ICU Level of Service A	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	25	190	205	675	655	25
Future Volume (vph)	25	190	205	675	655	25
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	100			76
Storage Lanes	1	1	1			1
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	25			40	40	
Link Distance (ft)	290			638	910	
Travel Time (s)	7.9			10.9	15.5	
Confl. Peds. (#/hr)		3				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	26	194	209	689	668	26
Shared Lane Traffic (%)						
Lane Group Flow (vph)	26	194	209	689	668	26
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	665	655	0
Future Vol, veh/h	0	0	0	665	655	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	0	0	0	700	689	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1389	689	689	0	-	0
Stage 1	689	-	-	-	-	-
Stage 2	700	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	159	449	915	-	-	-
Stage 1	502	-	-	-	-	-
Stage 2	496	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	159	449	915	-	-	-
Mov Cap-2 Maneuver	300	-	-	-	-	-
Stage 1	502	-	-	-	-	-
Stage 2	496	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	915	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↑		↰	↑	
Traffic Vol, veh/h	2	5	3	85	2	45	5	620	110	25	625	5
Future Vol, veh/h	2	5	3	85	2	45	5	620	110	25	625	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	-	25	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	2	5	3	89	2	47	5	653	116	26	658	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1377	1376	661	1380	1378	653	663	0	-	653	0	0
Stage 1	713	713	-	663	663	-	-	-	-	-	-	-
Stage 2	664	663	-	717	715	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	123	146	466	123	146	471	935	-	0	943	-	-
Stage 1	426	438	-	454	462	-	-	-	0	-	-	-
Stage 2	453	462	-	424	438	-	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	107	141	466	116	141	471	935	-	-	943	-	-
Mov Cap-2 Maneuver	107	141	-	116	141	-	-	-	-	-	-	-
Stage 1	424	426	-	452	460	-	-	-	-	-	-	-
Stage 2	403	460	-	404	426	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	28.3	82.4	0.1	0.3
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	935	-	165	170	943	-	-
HCM Lane V/C Ratio	0.006	-	0.064	0.817	0.028	-	-
HCM Control Delay (s)	8.9	-	28.3	82.4	8.9	-	-
HCM Lane LOS	A	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	5.5	0.1	-	-

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	155	75	80	620	605	120
Future Vol, veh/h	155	75	80	620	605	120
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	50	0	25	-	-	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	160	77	82	639	624	124

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1427	312	624	0	-	0
Stage 1	624	-	-	-	-	-
Stage 2	803	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	~ 139	690	967	-	-	0
Stage 1	502	-	-	-	-	0
Stage 2	444	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 127	690	967	-	-	-
Mov Cap-2 Maneuver	264	-	-	-	-	-
Stage 1	459	-	-	-	-	-
Stage 2	444	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	28.8	1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	967	-	264	690	-
HCM Lane V/C Ratio	0.085	-	0.605	0.112	-
HCM Control Delay (s)	9.1	-	37.5	10.9	-
HCM Lane LOS	A	-	E	B	-
HCM 95th %tile Q(veh)	0.3	-	3.6	0.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	190	205	675	655	25
Future Vol, veh/h	25	190	205	675	655	25
Conflicting Peds, #/hr	0	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	0	0	100	-	-	76
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	26	194	209	689	668	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1775	337	668	0	-	0
Stage 1	668	-	-	-	-	-
Stage 2	1107	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	83	665	931	-	-	0
Stage 1	477	-	-	-	-	0
Stage 2	319	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	64	663	931	-	-	-
Mov Cap-2 Maneuver	185	-	-	-	-	-
Stage 1	370	-	-	-	-	-
Stage 2	319	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.4	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	931	-	185	663	-
HCM Lane V/C Ratio	0.225	-	0.138	0.292	-
HCM Control Delay (s)	10	-	27.5	12.7	-
HCM Lane LOS	A	-	D	B	-
HCM 95th %tile Q(veh)	0.9	-	0.5	1.2	-

Intersection: 1: Highway 101 & North Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 2: Highway 101 & Driveway/Munsel Lake Road

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	L
Maximum Queue (ft)	53	207	35	138	52
Average Queue (ft)	11	75	3	16	14
95th Queue (ft)	37	167	20	69	41
Link Distance (ft)	193	645		403	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			25		100
Storage Blk Time (%)			0	1	
Queuing Penalty (veh)			3	0	

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	100	236	62	46
Average Queue (ft)	93	137	24	3
95th Queue (ft)	112	272	51	22
Link Distance (ft)		217		
Upstream Blk Time (%)		6		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)	50		25	75
Storage Blk Time (%)	86	0	3	
Queuing Penalty (veh)	64	1	22	

Intersection: 9: Highway 101 & 46th Street

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	109	160	136	56	35	60
Average Queue (ft)	25	39	53	2	0	2
95th Queue (ft)	73	100	101	19	0	20
Link Distance (ft)	246	246		620	862	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			100			76
Storage Blk Time (%)			1			0
Queuing Penalty (veh)			9			0

Network Summary

Network wide Queuing Penalty: 98

Major Street:	Highway 101
Minor Street:	Munsel Lake Road
Project Name:	Three Mile Prairie
City/County:	Florence / Lane
Analysis Year:	2021
Alternative:	No Build
Meet 70% Warrants?:	No
	100%

Major

Approach Lanes:	1

Minor

Approach Lanes:	1

Major

Approach Volumes (vph):	1390

Minor

Approach Volume (vph):	132
Right Turn Volume (vph):	45
Capacity of Shared/Exclusive Right Turn Lane[1]:	1619
Right Turn Discount:	1376
Right Turn Volume included in Warrant:	0
Minor Approach Volume in Warrant:	87

Major Approach K factor:	13.9
Minor Approach K factor:	8.23

[1] Capacity obtained from unsignalized intersection analysis
For guidance on preliminary signal warrant analysis, refer to the Analysis Procedures Manual.

Last Updated: January 2018

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Highway 101	**Minor Street:**	Munsel Lake Road
Project:	Three Mile Prairie	**City/County:**	Florence / Lane
Year:	2021	**Alternative:**	No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250

X	100 percent of standard warrants
	70 percent of standard warrants[2]

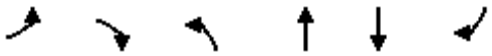
Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	10000	N
	Minor	1	2650	1057	
Case B	Major	1	13300	10000	N
	Minor	1	1350	1057	

M Weishar 10/08/20	Reviewer and Date:

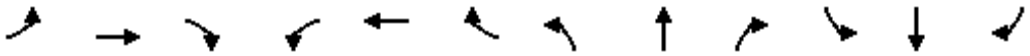
[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.



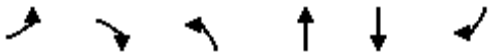
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	5	16	26	665	655	9
Future Volume (vph)	5	16	26	665	655	9
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	25			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.896				0.998	
Flt Protected	0.989		0.950			
Satd. Flow (prot)	1551	0	1884	1733	1729	0
Flt Permitted	0.989		0.950			
Satd. Flow (perm)	1551	0	1884	1733	1729	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	355			890	973	
Travel Time (s)	9.7			15.2	16.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	5	17	27	700	689	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	22	0	27	700	698	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		



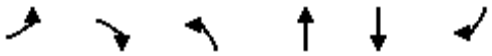
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	85	0	47	0	644	110	26	640	0
Future Volume (vph)	0	0	0	85	0	47	0	644	110	26	640	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	0		0	0		50	25		0	100		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.952			0.980				
Flt Protected					0.969					0.950		
Satd. Flow (prot)	0	1716	0	0	1614	0	0	1700	0	1884	1733	0
Flt Permitted					0.969					0.950		
Satd. Flow (perm)	0	1716	0	0	1614	0	0	1700	0	1884	1733	0
Link Speed (mph)		30			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		6.2			13.2			7.8			15.2	
Peak Hour Factor	0.92	0.92	0.92	0.95	0.92	0.95	0.92	0.95	0.95	0.95	0.95	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	1%	0%	0%	1%	2%
Adj. Flow (vph)	0	0	0	89	0	49	0	678	116	27	674	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	138	0	0	794	0	27	674	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 58.9%		ICU Level of Service B	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	162	70	80	637	616	124
Future Volume (vph)	162	70	80	637	616	124
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	50	0	25			75
Storage Lanes	1	1	1			1
Taper Length (ft)	50		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	20			40	40	
Link Distance (ft)	261			910	460	
Travel Time (s)	8.9			15.5	7.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	167	72	82	657	635	128
Shared Lane Traffic (%)						
Lane Group Flow (vph)	167	72	82	657	635	128
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.8%		ICU Level of Service A	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	26	190	205	691	665	26
Future Volume (vph)	26	190	205	691	665	26
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	100			76
Storage Lanes	1	1	1			1
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1473	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1473	1884	1733	3292	1488
Link Speed (mph)	25			40	40	
Link Distance (ft)	290			638	910	
Travel Time (s)	7.9			10.9	15.5	
Confl. Peds. (#/hr)		3				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	1%	1%	0%
Adj. Flow (vph)	27	194	209	705	679	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	194	209	705	679	27
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 50.4%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	16	26	665	655	9
Future Vol, veh/h	5	16	26	665	655	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	5	17	27	700	689	9

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1448	694	698	0	-	0
Stage 1	694	-	-	-	-	-
Stage 2	754	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	146	446	908	-	-	-
Stage 1	499	-	-	-	-	-
Stage 2	468	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	142	446	908	-	-	-
Mov Cap-2 Maneuver	282	-	-	-	-	-
Stage 1	484	-	-	-	-	-
Stage 2	468	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.7	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	908	-	392	-	-
HCM Lane V/C Ratio	0.03	-	0.056	-	-
HCM Control Delay (s)	9.1	-	14.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	85	0	47	0	644	110	26	640	0
Future Vol, veh/h	0	0	0	85	0	47	0	644	110	26	640	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	95	92	95	92	95	95	95	95	92
Heavy Vehicles, %	2	2	2	0	2	0	2	1	0	0	1	2
Mvmt Flow	0	0	0	89	0	49	0	678	116	27	674	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1406	1406	674	1406	1406	678	-	0	-	678	0	0
Stage 1	728	728	-	678	678	-	-	-	-	-	-	-
Stage 2	678	678	-	728	728	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.1	6.52	6.2	-	-	-	4.1	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.1	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.1	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.5	4.018	3.3	-	-	-	2.2	-	-
Pot Cap-1 Maneuver	117	139	455	118	139	456	0	-	0	923	-	0
Stage 1	415	429	-	445	452	-	0	-	0	-	-	0
Stage 2	442	452	-	418	429	-	0	-	0	-	-	0
Platoon blocked, %								-			-	
Mov Cap-1 Maneuver	102	135	455	115	135	456	-	-	-	923	-	-
Mov Cap-2 Maneuver	224	254	-	246	259	-	-	-	-	-	-	-
Stage 1	415	417	-	445	452	-	-	-	-	-	-	-
Stage 2	394	452	-	406	417	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	19.7	0	0.4
HCM LOS	A	C		

Minor Lane/Major Mvmt	NBT	EBLn1	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	382	923	-
HCM Lane V/C Ratio	-	-	0.364	0.03	-
HCM Control Delay (s)	-	0	19.7	9	-
HCM Lane LOS	-	A	C	A	-
HCM 95th %tile Q(veh)	-	-	1.6	0.1	-

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	162	70	80	637	616	124
Future Vol, veh/h	162	70	80	637	616	124
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	50	0	25	-	-	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	167	72	82	657	635	128

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1456	318	635	0	-	0
Stage 1	635	-	-	-	-	-
Stage 2	821	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	~ 133	684	958	-	-	0
Stage 1	496	-	-	-	-	0
Stage 2	436	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 122	684	958	-	-	-
Mov Cap-2 Maneuver	258	-	-	-	-	-
Stage 1	453	-	-	-	-	-
Stage 2	436	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	32.2	1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	958	-	258	684	-
HCM Lane V/C Ratio	0.086	-	0.647	0.106	-
HCM Control Delay (s)	9.1	-	41.4	10.9	-
HCM Lane LOS	A	-	E	B	-
HCM 95th %tile Q(veh)	0.3	-	4.1	0.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	26	190	205	691	665	26
Future Vol, veh/h	26	190	205	691	665	26
Conflicting Peds, #/hr	0	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	0	0	100	-	-	76
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	1	0	1	1	0
Mvmt Flow	27	194	209	705	679	27

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1802	343	679	0	-	0
Stage 1	679	-	-	-	-	-
Stage 2	1123	-	-	-	-	-
Critical Hdwy	6.6	6.915	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3095	2.2	-	-	-
Pot Cap-1 Maneuver	80	656	923	-	-	0
Stage 1	471	-	-	-	-	0
Stage 2	314	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	62	654	923	-	-	-
Mov Cap-2 Maneuver	182	-	-	-	-	-
Stage 1	365	-	-	-	-	-
Stage 2	314	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.6	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	923	-	182	654	-
HCM Lane V/C Ratio	0.227	-	0.146	0.296	-
HCM Control Delay (s)	10	-	28.1	12.8	-
HCM Lane LOS	B	-	D	B	-
HCM 95th %tile Q(veh)	0.9	-	0.5	1.2	-

Intersection: 1: Highway 101 & North Access

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	35	61
Average Queue (ft)	13	10
95th Queue (ft)	41	37
Link Distance (ft)	323	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		25
Storage Blk Time (%)		2
Queuing Penalty (veh)		13

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	WB	NB	SB
Directions Served	LTR	TR	L
Maximum Queue (ft)	131	71	33
Average Queue (ft)	66	7	10
95th Queue (ft)	112	39	34
Link Distance (ft)	645	403	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			100
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	100	236	62	60
Average Queue (ft)	83	89	28	5
95th Queue (ft)	115	233	61	31
Link Distance (ft)		217		
Upstream Blk Time (%)		11		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)	50		25	75
Storage Blk Time (%)	70	0	5	0
Queuing Penalty (veh)	48	0	32	0

Intersection: 9: Highway 101 & 46th Street

Movement	EB	EB	NB	NB
Directions Served	L	R	L	T
Maximum Queue (ft)	61	107	113	62
Average Queue (ft)	20	44	47	2
95th Queue (ft)	54	91	88	21
Link Distance (ft)	246	246		620
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			100	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			2	

Network Summary

Network wide Queuing Penalty: 96

Major Street:	Highway 101
Minor Street:	Munsel Lake Road
Project Name:	Three Mile Prairie
City/County:	Florence / Lane
Analysis Year:	2021
Alternative:	Build
Meet 70% Warrants?:	No
	100%

Major	
Approach Lanes:	1
Minor	
Approach Lanes:	1
Major	
Approach Volumes (vph):	1420
Minor	
Approach Volume (vph):	132
Right Turn Volume (vph):	47
Capacity of Shared/Exclusive Right Turn Lane[1]:	1619
Right Turn Discount:	1376
Right Turn Volume included in Warrant:	0
Minor Approach Volume in Warrant:	85
Major Approach K factor:	13.9
Minor Approach K factor:	8.23

[1] Capacity obtained from unsignalized intersection analysis
For guidance on preliminary signal warrant analysis, refer to the Analysis Procedures Manual.

Last Updated: January 2018

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Highway 101	**Minor Street:**	Munsel Lake Road
Project:	Three Mile Prairie	**City/County:**	Florence / Lane
Year:	2021	**Alternative:**	Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	10216	N
	Minor	1	2650	1033	
Case B	Major	1	13300	10216	N
	Minor	1	1350	1033	

M Weishar 10/08/20 | Reviewer and Date:

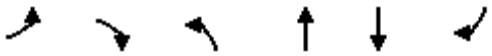
[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

Appendix D

2023 Synchro & SimTraffic Reports

Preliminary Signal Warrants

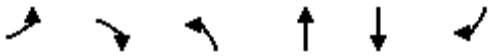


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	685	710	0
Future Volume (vph)	0	0	0	685	710	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	25			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1750	0	1983	1733	1733	0
Flt Permitted						
Satd. Flow (perm)	1750	0	1983	1733	1733	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	355			890	973	
Travel Time (s)	9.7			15.2	16.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	0	0	0	721	747	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	721	747	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

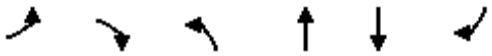
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	5	5	96	2	45	5	660	120	27	650	5
Future Volume (vph)	2	5	5	96	2	45	5	660	120	27	650	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	0		0	0		50	25		0	100		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.944			0.958			0.977			0.999	
Flt Protected		0.992			0.967		0.950			0.950		
Satd. Flow (prot)	0	1639	0	0	1621	0	1662	1695	0	1884	1731	0
Flt Permitted		0.992			0.967		0.950			0.950		
Satd. Flow (perm)	0	1639	0	0	1621	0	1662	1695	0	1884	1731	0
Link Speed (mph)		30			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		6.2			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	2	5	5	101	2	47	5	695	126	28	684	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	12	0	0	150	0	5	821	0	28	689	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	165	80	85	665	645	130
Future Volume (vph)	165	80	85	665	645	130
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	50	0	25			75
Storage Lanes	1	1	1			1
Taper Length (ft)	50		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	20			40	40	
Link Distance (ft)	261			910	460	
Travel Time (s)	8.9			15.5	7.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	170	82	88	686	665	134
Shared Lane Traffic (%)						
Lane Group Flow (vph)	170	82	88	686	665	134
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 54.6%		ICU Level of Service A	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	27	200	205	720	700	27
Future Volume (vph)	27	200	205	720	700	27
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	100			76
Storage Lanes	1	1	1			1
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1473	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1473	1884	1733	3292	1488
Link Speed (mph)	25			40	40	
Link Distance (ft)	290			638	910	
Travel Time (s)	7.9			10.9	15.5	
Confl. Peds. (#/hr)		3				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	1%	1%	0%
Adj. Flow (vph)	28	204	209	735	714	28
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	204	209	735	714	28
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.1%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	685	710	0
Future Vol, veh/h	0	0	0	685	710	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	0	0	0	721	747	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1468	747	747	0	-	0
Stage 1	747	-	-	-	-	-
Stage 2	721	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	142	416	870	-	-	-
Stage 1	472	-	-	-	-	-
Stage 2	485	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	142	416	870	-	-	-
Mov Cap-2 Maneuver	283	-	-	-	-	-
Stage 1	472	-	-	-	-	-
Stage 2	485	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	870	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	16

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	5	5	96	2	45	5	660	120	27	650	5
Future Vol, veh/h	2	5	5	96	2	45	5	660	120	27	650	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	-	25	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	2	5	5	101	2	47	5	695	126	28	684	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1449	1448	687	1453	1450	695	689	0	-	695	0	0
Stage 1	743	743	-	705	705	-	-	-	-	-	-	-
Stage 2	706	705	-	748	745	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	110	133	450	109	132	446	915	-	0	910	-	-
Stage 1	410	425	-	430	442	-	-	-	0	-	-	-
Stage 2	430	442	-	408	424	-	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	94	128	450	~ 101	127	446	915	-	-	910	-	-
Mov Cap-2 Maneuver	94	128	-	~ 101	127	-	-	-	-	-	-	-
Stage 1	408	412	-	428	440	-	-	-	-	-	-	-
Stage 2	380	440	-	386	411	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	28.2	163.4	0.1	0.4
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	915	-	168	139	910	-	-
HCM Lane V/C Ratio	0.006	-	0.075	1.083	0.031	-	-
HCM Control Delay (s)	9	-	28.2	163.4	9.1	-	-
HCM Lane LOS	A	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	8.3	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	5.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	165	80	85	665	645	130
Future Vol, veh/h	165	80	85	665	645	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	50	0	25	-	-	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	170	82	88	686	665	134

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1527	333	665	0	-	0
Stage 1	665	-	-	-	-	-
Stage 2	862	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	~ 120	669	934	-	-	0
Stage 1	478	-	-	-	-	0
Stage 2	417	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 109	669	934	-	-	-
Mov Cap-2 Maneuver	244	-	-	-	-	-
Stage 1	433	-	-	-	-	-
Stage 2	417	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	35.9	1	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	934	-	244	669	-
HCM Lane V/C Ratio	0.094	-	0.697	0.123	-
HCM Control Delay (s)	9.3	-	47.9	11.1	-
HCM Lane LOS	A	-	E	B	-
HCM 95th %tile Q(veh)	0.3	-	4.6	0.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	27	200	205	720	700	27
Future Vol, veh/h	27	200	205	720	700	27
Conflicting Peds, #/hr	0	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	0	0	100	-	-	76
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	1	0	1	1	0
Mvmt Flow	28	204	209	735	714	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1867	360	714	0	-	0
Stage 1	714	-	-	-	-	-
Stage 2	1153	-	-	-	-	-
Critical Hdwy	6.6	6.915	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3095	2.2	-	-	-
Pot Cap-1 Maneuver	73	640	895	-	-	0
Stage 1	452	-	-	-	-	0
Stage 2	303	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	56	638	895	-	-	-
Mov Cap-2 Maneuver	173	-	-	-	-	-
Stage 1	346	-	-	-	-	-
Stage 2	303	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.3	2.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	895	-	173	638	-
HCM Lane V/C Ratio	0.234	-	0.159	0.32	-
HCM Control Delay (s)	10.2	-	29.7	13.3	-
HCM Lane LOS	B	-	D	B	-
HCM 95th %tile Q(veh)	0.9	-	0.6	1.4	-

Intersection: 1: Highway 101 & North Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	L
Maximum Queue (ft)	32	427	34	40	55
Average Queue (ft)	12	107	2	1	15
95th Queue (ft)	35	281	16	12	43
Link Distance (ft)	226	645		403	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			25		100
Storage Blk Time (%)			0	0	
Queuing Penalty (veh)			3	0	

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	100	236	61	46
Average Queue (ft)	89	120	27	2
95th Queue (ft)	112	274	56	15
Link Distance (ft)		217		
Upstream Blk Time (%)		12		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)	50		25	75
Storage Blk Time (%)	72	1	4	
Queuing Penalty (veh)	58	1	27	

Intersection: 9: Highway 101 & 46th Street

Movement	EB	EB	NB	SB
Directions Served	L	R	L	T
Maximum Queue (ft)	110	82	108	30
Average Queue (ft)	28	30	48	1
95th Queue (ft)	65	79	76	10
Link Distance (ft)	246	246		862
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			100	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			1	

Network Summary

Network wide Queuing Penalty: 90

Major Street:	Highway 101
Minor Street:	Munsel Lake Road
Project Name:	Three Mile Prairie
City/County:	Florence / Lane
Analysis Year:	2023
Alternative:	No Build
Meet 70% Warrants?:	No
	100%

Major

Approach Lanes:	1

Minor

Approach Lanes:	1

Major

Approach Volumes (vph):	1467

Minor

Approach Volume (vph):	143
Right Turn Volume (vph):	45
Capacity of Shared/Exclusive Right Turn Lane[1]:	1619
Right Turn Discount:	1376
Right Turn Volume included in Warrant:	0
Minor Approach Volume in Warrant:	98

Major Approach K factor:	13.9
Minor Approach K factor:	8.23

[1] Capacity obtained from unsignalized intersection analysis
For guidance on preliminary signal warrant analysis, refer to the Analysis Procedures Manual.

Last Updated: January 2018

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Highway 101	**Minor Street:**	Munsel Lake Road
Project:	Three Mile Prairie	**City/County:**	Florence / Lane
Year:	2023	**Alternative:**	No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

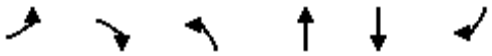
Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	10554	N
	Minor	1	2650	1191	
Case B	Major	1	13300	10554	N
	Minor	1	1350	1191	

M Weishar 10/08/20 | Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

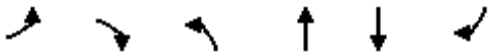


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	5	15	25	715	685	17
Future Volume (vph)	5	15	25	715	685	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	25			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.897				0.997	
Flt Protected	0.988		0.950			
Satd. Flow (prot)	1551	0	1884	1733	1728	0
Flt Permitted	0.988		0.950			
Satd. Flow (perm)	1551	0	1884	1733	1728	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	355			890	973	
Travel Time (s)	9.7			15.2	16.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	5	16	26	753	721	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	0	26	753	739	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 50.9%		ICU Level of Service A	
Analysis Period (min) 15			

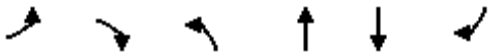
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1	14	96	2	48	23	682	120	28	664	1
Future Volume (vph)	5	1	14	96	2	48	23	682	120	28	664	1
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	75		0	0		50	25		0	100		0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	75			25			25			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.859			0.955			0.978				
Flt Protected	0.950				0.968		0.950			0.950		
Satd. Flow (prot)	1662	1503	0	0	1618	0	1662	1697	0	1884	1733	0
Flt Permitted	0.950				0.968		0.950			0.950		
Satd. Flow (perm)	1662	1503	0	0	1618	0	1662	1697	0	1884	1733	0
Link Speed (mph)		25			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		7.4			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	5	1	15	101	2	51	24	718	126	29	699	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	16	0	0	154	0	24	844	0	29	700	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 69.3%		ICU Level of Service C	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	178	80	85	697	666	137
Future Volume (vph)	178	80	85	697	666	137
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	50	0	25			75
Storage Lanes	1	1	1			1
Taper Length (ft)	50		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	20			40	40	
Link Distance (ft)	261			910	460	
Travel Time (s)	8.9			15.5	7.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	184	82	88	719	687	141
Shared Lane Traffic (%)						
Lane Group Flow (vph)	184	82	88	719	687	141
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 57.2%		ICU Level of Service B	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	28	200	205	723	721	28
Future Volume (vph)	28	200	205	723	721	28
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	100			76
Storage Lanes	1	1	1			1
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	25			40	40	
Link Distance (ft)	290			638	910	
Travel Time (s)	7.9			10.9	15.5	
Confl. Peds. (#/hr)		3				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	29	204	209	738	736	29
Shared Lane Traffic (%)						
Lane Group Flow (vph)	29	204	209	738	736	29
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.3%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	15	25	715	685	17
Future Vol, veh/h	5	15	25	715	685	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	5	16	26	753	721	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1535	730	739	0	-	0
Stage 1	730	-	-	-	-	-
Stage 2	805	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	129	426	876	-	-	-
Stage 1	481	-	-	-	-	-
Stage 2	443	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	125	426	876	-	-	-
Mov Cap-2 Maneuver	265	-	-	-	-	-
Stage 1	467	-	-	-	-	-
Stage 2	443	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.3	0.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	876	-	370	-	-
HCM Lane V/C Ratio	0.03	-	0.057	-	-
HCM Control Delay (s)	9.2	-	15.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	22.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	1	14	96	2	48	23	682	120	28	664	1
Future Vol, veh/h	5	1	14	96	2	48	23	682	120	28	664	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	Free	-	-	None
Storage Length	75	-	-	-	-	-	25	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	5	1	15	101	2	51	24	718	126	29	699	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1525	1524	700	1532	1524	718	700	0	-	718	0	0
Stage 1	758	758	-	766	766	-	-	-	-	-	-	-
Stage 2	767	766	-	766	758	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	97	119	443	~ 96	119	432	906	-	0	892	-	-
Stage 1	402	418	-	398	415	-	-	-	0	-	-	-
Stage 2	398	415	-	398	418	-	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	81	112	443	~ 88	112	432	906	-	-	892	-	-
Mov Cap-2 Maneuver	81	112	-	~ 88	112	-	-	-	-	-	-	-
Stage 1	392	404	-	388	404	-	-	-	-	-	-	-
Stage 2	340	404	-	371	404	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.5	230.4	0.3	0.4
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	906	-	81	370	123	892	-	-
HCM Lane V/C Ratio	0.027	-	0.065	0.043	1.249	0.033	-	-
HCM Control Delay (s)	9.1	-	52.5	15.2	230.4	9.2	-	-
HCM Lane LOS	A	-	F	C	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	0.1	9.7	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	7.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	178	80	85	697	666	137
Future Vol, veh/h	178	80	85	697	666	137
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	50	0	25	-	-	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	184	82	88	719	687	141

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1582	344	687	0	-	0
Stage 1	687	-	-	-	-	-
Stage 2	895	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	~ 111	658	916	-	-	0
Stage 1	466	-	-	-	-	0
Stage 2	402	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 100	658	916	-	-	-
Mov Cap-2 Maneuver	233	-	-	-	-	-
Stage 1	421	-	-	-	-	-
Stage 2	402	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	45.4	1	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	916	-	233	658	-
HCM Lane V/C Ratio	0.096	-	0.788	0.125	-
HCM Control Delay (s)	9.3	-	60.7	11.3	-
HCM Lane LOS	A	-	F	B	-
HCM 95th %tile Q(veh)	0.3	-	5.8	0.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	200	205	723	721	28
Future Vol, veh/h	28	200	205	723	721	28
Conflicting Peds, #/hr	0	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	0	0	100	-	-	76
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	29	204	209	738	736	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1892	371	736	0	-	0
Stage 1	736	-	-	-	-	-
Stage 2	1156	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	70	632	879	-	-	0
Stage 1	440	-	-	-	-	0
Stage 2	302	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	53	630	879	-	-	-
Mov Cap-2 Maneuver	169	-	-	-	-	-
Stage 1	335	-	-	-	-	-
Stage 2	302	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.5	2.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	879	-	169	630	-
HCM Lane V/C Ratio	0.238	-	0.169	0.324	-
HCM Control Delay (s)	10.4	-	30.6	13.4	-
HCM Lane LOS	B	-	D	B	-
HCM 95th %tile Q(veh)	0.9	-	0.6	1.4	-

Intersection: 1: Highway 101 & North Access

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	35	33
Average Queue (ft)	15	9
95th Queue (ft)	43	32
Link Distance (ft)	323	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		25
Storage Blk Time (%)		2
Queuing Penalty (veh)		13

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	EB	WB	NB	NB	SB
Directions Served	L	TR	LTR	L	TR	L
Maximum Queue (ft)	29	34	207	34	73	85
Average Queue (ft)	4	17	83	10	9	22
95th Queue (ft)	19	43	163	34	41	55
Link Distance (ft)		226	644		397	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	75			25		100
Storage Blk Time (%)				2	1	0
Queuing Penalty (veh)				12	0	0

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	100	236	61	48
Average Queue (ft)	99	236	26	3
95th Queue (ft)	101	240	56	23
Link Distance (ft)		217		
Upstream Blk Time (%)		99		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)	50		25	75
Storage Blk Time (%)	100	1	6	
Queuing Penalty (veh)	80	2	40	

Intersection: 9: Highway 101 & 46th Street

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	T
Maximum Queue (ft)	152	128	115	153	34
Average Queue (ft)	55	55	44	6	1
95th Queue (ft)	116	104	83	53	11
Link Distance (ft)	246	246		620	862
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)			1		
Queuing Penalty (veh)			6		

Network Summary

Network wide Queuing Penalty: 153

Major Street:	Highway 101
Minor Street:	Munsel Lake Road
Project Name:	Three Mile Prairie
City/County:	Florence / Lane
Analysis Year:	2023
Alternative:	Build 3 Mile Prairie Ph2
Meet 70% Warrants?:	No
	100%

Major

Approach Lanes:	1

Minor

Approach Lanes:	1

Major

Approach Volumes (vph):	1517

Minor

Approach Volume (vph):	149
Right Turn Volume (vph):	48
Capacity of Shared/Exclusive Right Turn Lane[1]:	1619
Right Turn Discount:	1376
Right Turn Volume included in Warrant:	0
Minor Approach Volume in Warrant:	101

Major Approach K factor:	13.9
Minor Approach K factor:	8.23

[1] Capacity obtained from unsignalized intersection analysis
For guidance on preliminary signal warrant analysis, refer to the Analysis Procedures Manual.

Last Updated: January 2018

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Highway 101	**Minor Street:**	Munsel Lake Road
Project:	Three Mile Prairie	**City/County:**	Florence / Lane
Year:	2023	**Alternative:**	Build 3 Mile Prairie Ph2

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

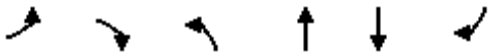
Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	10914	N
	Minor	1	2650	1227	
Case B	Major	1	13300	10914	N
	Minor	1	1350	1227	

M Weishar 10/08/20 | Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

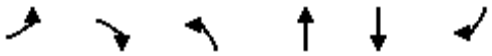


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	734	703	0
Future Volume (vph)	0	0	0	734	703	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	25			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1750	0	1983	1733	1733	0
Flt Permitted						
Satd. Flow (perm)	1750	0	1983	1733	1733	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	355			890	973	
Travel Time (s)	9.7			15.2	16.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	0	0	0	773	740	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	773	740	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.3%		ICU Level of Service A	
Analysis Period (min) 15			

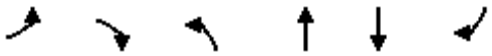
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	5	5	99	2	45	5	684	123	27	668	5
Future Volume (vph)	2	5	5	99	2	45	5	684	123	27	668	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	0		0	0		50	25		0	100		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.944			0.959			0.977			0.999	
Flt Protected		0.992			0.967		0.950			0.950		
Satd. Flow (prot)	0	1639	0	0	1623	0	1662	1695	0	1884	1731	0
Flt Permitted		0.992			0.967		0.950			0.950		
Satd. Flow (perm)	0	1639	0	0	1623	0	1662	1695	0	1884	1731	0
Link Speed (mph)		30			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		6.2			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	2	5	5	104	2	47	5	720	129	28	703	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	12	0	0	153	0	5	849	0	28	708	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		



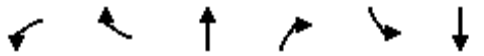
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	165	80	85	692	666	130
Future Volume (vph)	165	80	85	692	666	130
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	50	0	25			75
Storage Lanes	1	1	1			1
Taper Length (ft)	50		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	20			40	40	
Link Distance (ft)	261			600	460	
Travel Time (s)	8.9			10.2	7.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	170	82	88	713	687	134
Shared Lane Traffic (%)						
Lane Group Flow (vph)	170	82	88	713	687	134
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.1%		ICU Level of Service B	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	30	200	205	770	743	28
Future Volume (vph)	30	200	205	770	743	28
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	100			76
Storage Lanes	1	1	1			1
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	25			40	40	
Link Distance (ft)	290			638	310	
Travel Time (s)	7.9			10.9	5.3	
Confl. Peds. (#/hr)		3				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	31	204	209	786	758	29
Shared Lane Traffic (%)						
Lane Group Flow (vph)	31	204	209	786	758	29
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 55.0%		ICU Level of Service A	
Analysis Period (min) 15			



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	27	44	745	53	21	728
Future Volume (vph)	27	44	745	53	21	728
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (ft)	0	0		0	50	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				50	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt		0.850	0.991			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1662	1488	1718	0	1662	3292
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1662	1488	1718	0	1662	3292
Link Speed (mph)	30		40			40
Link Distance (ft)	268		310			600
Travel Time (s)	6.1		5.3			10.2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Adj. Flow (vph)	28	46	784	56	22	766
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	46	840	0	22	766
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		16			16
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	12		12			12
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	734	703	0
Future Vol, veh/h	0	0	0	734	703	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	0	0	0	773	740	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1513	740	740	0	-	0
Stage 1	740	-	-	-	-	-
Stage 2	773	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	133	420	876	-	-	-
Stage 1	475	-	-	-	-	-
Stage 2	459	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	133	420	876	-	-	-
Mov Cap-2 Maneuver	274	-	-	-	-	-
Stage 1	475	-	-	-	-	-
Stage 2	459	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	876	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	19.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↱		↰	↱	
Traffic Vol, veh/h	2	5	5	99	2	45	5	684	123	27	668	5
Future Vol, veh/h	2	5	5	99	2	45	5	684	123	27	668	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	-	25	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	2	5	5	104	2	47	5	720	129	28	703	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1493	1492	706	1497	1494	720	708	0	-	720	0	0
Stage 1	762	762	-	730	730	-	-	-	-	-	-	-
Stage 2	731	730	-	767	764	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	103	125	439	~ 102	124	431	900	-	0	891	-	-
Stage 1	400	416	-	417	431	-	-	-	0	-	-	-
Stage 2	416	431	-	398	416	-	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	88	120	439	~ 95	119	431	900	-	-	891	-	-
Mov Cap-2 Maneuver	88	120	-	~ 95	119	-	-	-	-	-	-	-
Stage 1	398	403	-	414	428	-	-	-	-	-	-	-
Stage 2	366	428	-	376	403	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.8	205.6	0.1	0.4
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	900	-	158	129	891	-	-
HCM Lane V/C Ratio	0.006	-	0.08	1.191	0.032	-	-
HCM Control Delay (s)	9	-	29.8	205.6	9.2	-	-
HCM Lane LOS	A	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	9.3	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	165	80	85	692	666	130
Future Vol, veh/h	165	80	85	692	666	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	50	0	25	-	-	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	170	82	88	713	687	134

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1576	344	687	0	-	0
Stage 1	687	-	-	-	-	-
Stage 2	889	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	~ 112	658	916	-	-	0
Stage 1	466	-	-	-	-	0
Stage 2	405	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 101	658	916	-	-	-
Mov Cap-2 Maneuver	234	-	-	-	-	-
Stage 1	421	-	-	-	-	-
Stage 2	405	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	39.2	1	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	916	-	234	658	-
HCM Lane V/C Ratio	0.096	-	0.727	0.125	-
HCM Control Delay (s)	9.3	-	52.8	11.3	-
HCM Lane LOS	A	-	F	B	-
HCM 95th %tile Q(veh)	0.3	-	4.9	0.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	30	200	205	770	743	28
Future Vol, veh/h	30	200	205	770	743	28
Conflicting Peds, #/hr	0	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	0	0	100	-	-	76
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	31	204	209	786	758	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1962	382	758	0	-	0
Stage 1	758	-	-	-	-	-
Stage 2	1204	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	63	622	862	-	-	0
Stage 1	429	-	-	-	-	0
Stage 2	287	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	48	620	862	-	-	-
Mov Cap-2 Maneuver	161	-	-	-	-	-
Stage 1	325	-	-	-	-	-
Stage 2	287	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.1	2.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	862	-	161	620	-
HCM Lane V/C Ratio	0.243	-	0.19	0.329	-
HCM Control Delay (s)	10.5	-	32.5	13.6	-
HCM Lane LOS	B	-	D	B	-
HCM 95th %tile Q(veh)	1	-	0.7	1.4	-

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	27	44	745	53	21	728
Future Vol, veh/h	27	44	745	53	21	728
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	28	46	784	56	22	766

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1239	812	0	0	840	0
Stage 1	812	-	-	-	-	-
Stage 2	427	-	-	-	-	-
Critical Hdwy	6.6	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	183	382	-	-	804	-
Stage 1	440	-	-	-	-	-
Stage 2	632	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	178	382	-	-	804	-
Mov Cap-2 Maneuver	312	-	-	-	-	-
Stage 1	440	-	-	-	-	-
Stage 2	615	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.5	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	312	382	804	-
HCM Lane V/C Ratio	-	-	0.091	0.121	0.027	-
HCM Control Delay (s)	-	-	17.7	15.7	9.6	-
HCM Lane LOS	-	-	C	C	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0.4	0.1	-

Intersection: 1: Highway 101 & North Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	L
Maximum Queue (ft)	58	160	34	41	34
Average Queue (ft)	9	61	4	3	14
95th Queue (ft)	35	120	21	20	39
Link Distance (ft)	226	645		403	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			25		100
Storage Blk Time (%)			0	0	
Queuing Penalty (veh)			3	0	

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	100	236	35	60
Average Queue (ft)	95	192	27	5
95th Queue (ft)	118	313	48	30
Link Distance (ft)		217		
Upstream Blk Time (%)		36		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)	50		25	75
Storage Blk Time (%)	90	2	5	0
Queuing Penalty (veh)	72	3	34	0

Intersection: 9: Highway 101 & 46th Street

Movement	EB	EB	NB	NB
Directions Served	L	R	L	T
Maximum Queue (ft)	86	145	87	60
Average Queue (ft)	35	54	48	2
95th Queue (ft)	77	108	77	20
Link Distance (ft)	246	246		620
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			100	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	

Intersection: 12: Highway 101 & 47th Street

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (ft)	60	60	53
Average Queue (ft)	14	28	16
95th Queue (ft)	46	55	47
Link Distance (ft)	235	235	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)			0
Queuing Penalty (veh)			1

Network Summary

Network wide Queuing Penalty: 113

Major Street:	Highway 101
Minor Street:	Munsel Lake Road
Project Name:	Three Mile Prairie
City/County:	Florence / Lane
Analysis Year:	2023
Alternative:	Build Cannery Sta. Ph1
Meet 70% Warrants?:	No
	100%

Major	
Approach Lanes:	1
Minor	
Approach Lanes:	1
Major	
Approach Volumes (vph):	1512
Minor	
Approach Volume (vph):	146
Right Turn Volume (vph):	48
Capacity of Shared/Exclusive Right Turn Lane[1]:	1619
Right Turn Discount:	1376
Right Turn Volume included in Warrant:	0
Minor Approach Volume in Warrant:	98
Major Approach K factor:	13.9
Minor Approach K factor:	8.23

[1] Capacity obtained from unsignalized intersection analysis
For guidance on preliminary signal warrant analysis, refer to the Analysis Procedures Manual.

Last Updated: January 2018

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Highway 101	**Minor Street:**	Munsel Lake Road
Project:	Three Mile Prairie	**City/County:**	Florence / Lane
Year:	2023	**Alternative:**	Build Cannery Sta. Ph1

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

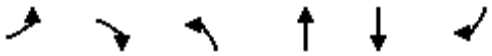
Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	10878	N
	Minor	1	2650	1191	
Case B	Major	1	13300	10878	N
	Minor	1	1350	1191	

M Weishar 10/08/20 | Reviewer and Date:

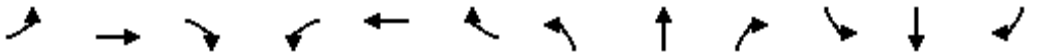
[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.



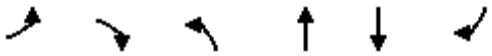
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	5	15	25	739	703	17
Future Volume (vph)	5	15	25	739	703	17
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	25			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.897				0.997	
Flt Protected	0.988		0.950			
Satd. Flow (prot)	1551	0	1884	1733	1728	0
Flt Permitted	0.988		0.950			
Satd. Flow (perm)	1551	0	1884	1733	1728	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	355			890	973	
Travel Time (s)	9.7			15.2	16.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	5	16	26	778	740	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	0	26	778	758	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.2%		ICU Level of Service A	
Analysis Period (min) 15			



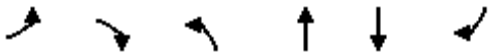
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1	14	99	2	48	23	706	123	28	682	1
Future Volume (vph)	5	1	14	99	2	48	23	706	123	28	682	1
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	75		0	0		50	25		0	100		0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	75			25			25			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.859			0.956			0.978				
Flt Protected	0.950				0.968		0.950			0.950		
Satd. Flow (prot)	1662	1503	0	0	1619	0	1662	1697	0	1884	1733	0
Flt Permitted	0.950				0.968		0.950			0.950		
Satd. Flow (perm)	1662	1503	0	0	1619	0	1662	1697	0	1884	1733	0
Link Speed (mph)		25			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		7.4			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	5	1	15	104	2	51	24	743	129	29	718	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	16	0	0	157	0	24	872	0	29	719	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	178	80	85	724	687	137
Future Volume (vph)	178	80	85	724	687	137
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	50	0	25			75
Storage Lanes	1	1	1			1
Taper Length (ft)	50		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	20			40	40	
Link Distance (ft)	261			600	460	
Travel Time (s)	8.9			10.2	7.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	184	82	88	746	708	141
Shared Lane Traffic (%)						
Lane Group Flow (vph)	184	82	88	746	708	141
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 58.7%		ICU Level of Service B	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	31	200	205	800	761	29
Future Volume (vph)	31	200	205	800	761	29
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	100			76
Storage Lanes	1	1	1			1
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	25			40	40	
Link Distance (ft)	290			638	310	
Travel Time (s)	7.9			10.9	5.3	
Confl. Peds. (#/hr)		3				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	32	204	209	816	777	30
Shared Lane Traffic (%)						
Lane Group Flow (vph)	32	204	209	816	777	30
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.7%		ICU Level of Service B	
Analysis Period (min) 15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	31	44	777	53	25	811
Future Volume (vph)	31	44	777	53	25	811
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (ft)	0	0		0	50	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				50	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt		0.850	0.991			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1662	1488	1718	0	1662	3292
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1662	1488	1718	0	1662	3292
Link Speed (mph)	30		40			40
Link Distance (ft)	268		310			600
Travel Time (s)	6.1		5.3			10.2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Adj. Flow (vph)	33	46	818	56	26	854
Shared Lane Traffic (%)						
Lane Group Flow (vph)	33	46	874	0	26	854
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		16			16
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	12		12			12
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	15	25	739	703	17
Future Vol, veh/h	5	15	25	739	703	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	5	16	26	778	740	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1579	749	758	0	-	0
Stage 1	749	-	-	-	-	-
Stage 2	830	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	122	415	862	-	-	-
Stage 1	471	-	-	-	-	-
Stage 2	432	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	118	415	862	-	-	-
Mov Cap-2 Maneuver	257	-	-	-	-	-
Stage 1	457	-	-	-	-	-
Stage 2	432	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.6	0.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	862	-	360	-	-
HCM Lane V/C Ratio	0.031	-	0.058	-	-
HCM Control Delay (s)	9.3	-	15.6	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	27.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	1	14	99	2	48	23	706	123	28	682	1
Future Vol, veh/h	5	1	14	99	2	48	23	706	123	28	682	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	Free	-	-	None
Storage Length	75	-	-	-	-	-	25	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	5	1	15	104	2	51	24	743	129	29	718	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1569	1568	719	1576	1568	743	719	0	-	743	0	0
Stage 1	777	777	-	791	791	-	-	-	-	-	-	-
Stage 2	792	791	-	785	777	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	91	112	432	~ 90	112	418	892	-	0	873	-	-
Stage 1	393	410	-	386	404	-	-	-	0	-	-	-
Stage 2	385	404	-	389	410	-	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	75	105	432	~ 82	105	418	892	-	-	873	-	-
Mov Cap-2 Maneuver	75	105	-	~ 82	105	-	-	-	-	-	-	-
Stage 1	382	396	-	376	393	-	-	-	-	-	-	-
Stage 2	328	393	-	362	396	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.8	290	0.3	0.4
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	892	-	75	358	113	873	-	-
HCM Lane V/C Ratio	0.027	-	0.07	0.044	1.388	0.034	-	-
HCM Control Delay (s)	9.1	-	56.6	15.5	290	9.3	-	-
HCM Lane LOS	A	-	F	C	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	0.1	10.9	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	178	80	85	724	687	137
Future Vol, veh/h	178	80	85	724	687	137
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	50	0	25	-	-	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	184	82	88	746	708	141

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1630	354	708	0	-	0
Stage 1	708	-	-	-	-	-
Stage 2	922	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	~ 103	648	900	-	-	0
Stage 1	455	-	-	-	-	0
Stage 2	391	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 93	648	900	-	-	-
Mov Cap-2 Maneuver	225	-	-	-	-	-
Stage 1	410	-	-	-	-	-
Stage 2	391	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	49.5	1	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	900	-	225	648	-
HCM Lane V/C Ratio	0.097	-	0.816	0.127	-
HCM Control Delay (s)	9.4	-	66.6	11.4	-
HCM Lane LOS	A	-	F	B	-
HCM 95th %tile Q(veh)	0.3	-	6.1	0.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	31	200	205	800	761	29
Future Vol, veh/h	31	200	205	800	761	29
Conflicting Peds, #/hr	0	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	0	0	100	-	-	76
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	32	204	209	816	777	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2011	392	777	0	-	0
Stage 1	777	-	-	-	-	-
Stage 2	1234	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	59	613	848	-	-	0
Stage 1	419	-	-	-	-	0
Stage 2	277	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	44	611	848	-	-	-
Mov Cap-2 Maneuver	155	-	-	-	-	-
Stage 1	316	-	-	-	-	-
Stage 2	277	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.5	2.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	848	-	155	611	-
HCM Lane V/C Ratio	0.247	-	0.204	0.334	-
HCM Control Delay (s)	10.6	-	34.1	13.8	-
HCM Lane LOS	B	-	D	B	-
HCM 95th %tile Q(veh)	1	-	0.7	1.5	-

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	31	44	777	53	25	811
Future Vol, veh/h	31	44	777	53	25	811
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	33	46	818	56	26	854

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1325	846	0	0	874	0
Stage 1	846	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Critical Hdwy	6.6	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	161	365	-	-	781	-
Stage 1	424	-	-	-	-	-
Stage 2	595	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	156	365	-	-	781	-
Mov Cap-2 Maneuver	292	-	-	-	-	-
Stage 1	424	-	-	-	-	-
Stage 2	575	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.4	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	292	365	781	-
HCM Lane V/C Ratio	-	-	0.112	0.127	0.034	-
HCM Control Delay (s)	-	-	18.9	16.3	9.8	-
HCM Lane LOS	-	-	C	C	A	-
HCM 95th %tile Q(veh)	-	-	0.4	0.4	0.1	-

Intersection: 1: Highway 101 & North Access

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	35	34
Average Queue (ft)	13	15
95th Queue (ft)	40	42
Link Distance (ft)	323	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		25
Storage Blk Time (%)		1
Queuing Penalty (veh)		10

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	EB	WB	NB	NB	SB
Directions Served	L	TR	LTR	L	TR	L
Maximum Queue (ft)	52	34	477	49	72	34
Average Queue (ft)	7	10	226	11	10	16
95th Queue (ft)	29	35	437	37	44	40
Link Distance (ft)		226	644		397	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	75			25		100
Storage Blk Time (%)				2	1	
Queuing Penalty (veh)				13	0	

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	100	236	60	47
Average Queue (ft)	99	236	25	2
95th Queue (ft)	101	240	51	16
Link Distance (ft)		217		
Upstream Blk Time (%)		100		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)	50		25	75
Storage Blk Time (%)	100	1	4	
Queuing Penalty (veh)	80	1	28	

Intersection: 9: Highway 101 & 46th Street

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	T
Maximum Queue (ft)	106	105	140	55	26
Average Queue (ft)	30	47	52	2	1
95th Queue (ft)	73	87	96	19	9
Link Distance (ft)	246	246		620	251
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)			1		
Queuing Penalty (veh)			6		

Intersection: 12: Highway 101 & 47th Street

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (ft)	60	60	60
Average Queue (ft)	22	26	15
95th Queue (ft)	53	52	45
Link Distance (ft)	235	235	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)			0
Queuing Penalty (veh)			2

Network Summary

Network wide Queuing Penalty: 139

Major Street:	Highway 101
Minor Street:	Munsel Lake Road
Project Name:	Three Mile Prairie
City/County:	Florence / Lane
Analysis Year:	2023
Alternative:	Build C Sta.Ph1 + 3MP Ph2
Meet 70% Warrants?:	No
	100%

Major

Approach Lanes:	1

Minor

Approach Lanes:	1

Major

Approach Volumes (vph):	1562

Minor

Approach Volume (vph):	148
Right Turn Volume (vph):	48
Capacity of Shared/Exclusive Right Turn Lane[1]:	1619
Right Turn Discount:	1376
Right Turn Volume included in Warrant:	0
Minor Approach Volume in Warrant:	100

Major Approach K factor:	13.9
Minor Approach K factor:	8.23

[1] Capacity obtained from unsignalized intersection analysis
For guidance on preliminary signal warrant analysis, refer to the Analysis Procedures Manual.

Last Updated: January 2018

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Highway 101	**Minor Street:**	Munsel Lake Road
Project:	Three Mile Prairie	**City/County:**	Florence / Lane
Year:	2023	**Alternative:**	Build C Sta.Ph1 + 3MP Ph2

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

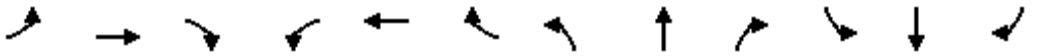
Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	11237	N
	Minor	1	2650	1215	
Case B	Major	1	13300	11237	N
	Minor	1	1350	1215	

M Weishar 10/08/20 | Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1	14	99	2	48	23	706	123	28	682	1
Future Volume (vph)	5	1	14	99	2	48	23	706	123	28	682	1
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	75		0	150		50	25		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	75			100			25			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.859			0.856			0.978				
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1662	1503	0	1662	1498	0	1662	1697	0	1884	1733	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1662	1503	0	1662	1498	0	1662	1697	0	1884	1733	0
Link Speed (mph)		25			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		7.4			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	5	1	15	104	2	51	24	743	129	29	718	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	16	0	104	53	0	24	872	0	29	719	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	27.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	1	14	99	2	48	23	706	123	28	682	1
Future Vol, veh/h	5	1	14	99	2	48	23	706	123	28	682	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	Free	-	-	None
Storage Length	75	-	-	-	-	-	25	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	5	1	15	104	2	51	24	743	129	29	718	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1569	1568	719	1576	1568	743	719	0	-	743	0	0
Stage 1	777	777	-	791	791	-	-	-	-	-	-	-
Stage 2	792	791	-	785	777	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	91	112	432	~ 90	112	418	892	-	0	873	-	-
Stage 1	393	410	-	386	404	-	-	-	0	-	-	-
Stage 2	385	404	-	389	410	-	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	75	105	432	~ 82	105	418	892	-	-	873	-	-
Mov Cap-2 Maneuver	75	105	-	~ 82	105	-	-	-	-	-	-	-
Stage 1	382	396	-	376	393	-	-	-	-	-	-	-
Stage 2	328	393	-	362	396	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.8	290	0.3	0.4
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	892	-	75	358	113	873	-	-
HCM Lane V/C Ratio	0.027	-	0.07	0.044	1.388	0.034	-	-
HCM Control Delay (s)	9.1	-	56.6	15.5	290	9.3	-	-
HCM Lane LOS	A	-	F	C	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	0.1	10.9	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

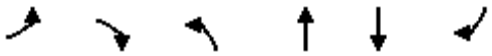
Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	29	54	168	55	34	135	61	25
Average Queue (ft)	4	17	73	5	11	11	18	1
95th Queue (ft)	20	45	148	28	36	59	49	8
Link Distance (ft)		226		644		397		841
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	75		150		25		100	
Storage Blk Time (%)			3		2	1		
Queuing Penalty (veh)			1		16	0		

Appendix E

2026 Synchro & SimTraffic Reports

Preliminary Signal Warrants

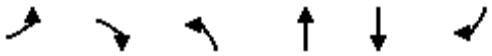


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	755	730	0
Future Volume (vph)	0	0	0	755	730	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	25			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1750	0	1983	1733	1733	0
Flt Permitted						
Satd. Flow (perm)	1750	0	1983	1733	1733	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	355			890	973	
Travel Time (s)	9.7			15.2	16.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	0	0	0	795	768	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	795	768	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

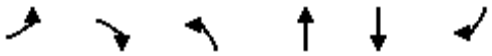
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	5	5	96	2	50	5	705	125	30	695	5
Future Volume (vph)	2	5	5	96	2	50	5	705	125	30	695	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	0		0	0		50	25		0	100		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.944			0.954			0.977			0.999	
Flt Protected		0.992			0.969		0.950			0.950		
Satd. Flow (prot)	0	1639	0	0	1618	0	1662	1695	0	1884	1731	0
Flt Permitted		0.992			0.969		0.950			0.950		
Satd. Flow (perm)	0	1639	0	0	1618	0	1662	1695	0	1884	1731	0
Link Speed (mph)		30			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		6.2			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	2	5	5	101	2	53	5	742	132	32	732	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	12	0	0	156	0	5	874	0	32	737	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	175	85	90	705	690	135
Future Volume (vph)	175	85	90	705	690	135
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	50	0	25			75
Storage Lanes	1	1	1			1
Taper Length (ft)	50		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	20			40	40	
Link Distance (ft)	261			910	460	
Travel Time (s)	8.9			15.5	7.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	180	88	93	727	711	139
Shared Lane Traffic (%)						
Lane Group Flow (vph)	180	88	93	727	711	139
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 57.5%		ICU Level of Service B	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	30	205	230	765	745	30
Future Volume (vph)	30	205	230	765	745	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	100			76
Storage Lanes	1	1	1			1
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1473	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1473	1884	1733	3292	1488
Link Speed (mph)	25			40	40	
Link Distance (ft)	290			638	910	
Travel Time (s)	7.9			10.9	15.5	
Confl. Peds. (#/hr)		3				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	1%	1%	0%
Adj. Flow (vph)	31	209	235	781	760	31
Shared Lane Traffic (%)						
Lane Group Flow (vph)	31	209	235	781	760	31
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 54.7%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	755	730	0
Future Vol, veh/h	0	0	0	755	730	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	0	0	0	795	768	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1563	768	768	0	-	0
Stage 1	768	-	-	-	-	-
Stage 2	795	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	124	405	855	-	-	-
Stage 1	461	-	-	-	-	-
Stage 2	448	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	124	405	855	-	-	-
Mov Cap-2 Maneuver	264	-	-	-	-	-
Stage 1	461	-	-	-	-	-
Stage 2	448	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	855	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	23.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	5	5	96	2	50	5	705	125	30	695	5
Future Vol, veh/h	2	5	5	96	2	50	5	705	125	30	695	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	-	25	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	2	5	5	101	2	53	5	742	132	32	732	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1552	1551	735	1556	1553	742	737	0	-	742	0	0
Stage 1	799	799	-	752	752	-	-	-	-	-	-	-
Stage 2	753	752	-	804	801	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	93	115	423	~ 93	114	419	878	-	0	874	-	-
Stage 1	382	401	-	405	421	-	-	-	0	-	-	-
Stage 2	405	421	-	380	400	-	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	78	110	423	~ 86	109	419	878	-	-	874	-	-
Mov Cap-2 Maneuver	78	110	-	~ 86	109	-	-	-	-	-	-	-
Stage 1	380	386	-	403	418	-	-	-	-	-	-	-
Stage 2	350	418	-	357	385	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	32.2	245.8	0.1	0.4
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	878	-	145	121	874	-	-
HCM Lane V/C Ratio	0.006	-	0.087	1.288	0.036	-	-
HCM Control Delay (s)	9.1	-	32.2	245.8	9.3	-	-
HCM Lane LOS	A	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	10.1	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	175	85	90	705	690	135
Future Vol, veh/h	175	85	90	705	690	135
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	50	0	25	-	-	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	180	88	93	727	711	139

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1624	356	711	0	-	0
Stage 1	711	-	-	-	-	-
Stage 2	913	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	~ 104	646	898	-	-	0
Stage 1	453	-	-	-	-	0
Stage 2	395	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 93	646	898	-	-	-
Mov Cap-2 Maneuver	225	-	-	-	-	-
Stage 1	406	-	-	-	-	-
Stage 2	395	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	47.1	1.1	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	898	-	225	646	-
HCM Lane V/C Ratio	0.103	-	0.802	0.136	-
HCM Control Delay (s)	9.5	-	64.5	11.4	-
HCM Lane LOS	A	-	F	B	-
HCM 95th %tile Q(veh)	0.3	-	5.9	0.5	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	30	205	230	765	745	30
Future Vol, veh/h	30	205	230	765	745	30
Conflicting Peds, #/hr	0	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	0	0	100	-	-	76
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	1	0	1	1	0
Mvmt Flow	31	209	235	781	760	31

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2011	383	760	0	-	0
Stage 1	760	-	-	-	-	-
Stage 2	1251	-	-	-	-	-
Critical Hdwy	6.6	6.915	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3095	2.2	-	-	-
Pot Cap-1 Maneuver	59	618	861	-	-	0
Stage 1	428	-	-	-	-	0
Stage 2	272	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	43	616	861	-	-	-
Mov Cap-2 Maneuver	152	-	-	-	-	-
Stage 1	311	-	-	-	-	-
Stage 2	272	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.5	2.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	861	-	152	616	-
HCM Lane V/C Ratio	0.273	-	0.201	0.34	-
HCM Control Delay (s)	10.7	-	34.6	13.8	-
HCM Lane LOS	B	-	D	B	-
HCM 95th %tile Q(veh)	1.1	-	0.7	1.5	-

Intersection: 1: Highway 101 & North Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	L
Maximum Queue (ft)	32	210	34	43	56
Average Queue (ft)	12	77	2	4	17
95th Queue (ft)	36	149	15	24	44
Link Distance (ft)	226	645		403	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			25		100
Storage Blk Time (%)			0	0	
Queuing Penalty (veh)			4	0	

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	100	236	87	46
Average Queue (ft)	99	217	31	3
95th Queue (ft)	100	297	63	22
Link Distance (ft)		217		
Upstream Blk Time (%)		68		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)	50		25	75
Storage Blk Time (%)	98	1	6	
Queuing Penalty (veh)	83	2	41	

Intersection: 9: Highway 101 & 46th Street

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	T
Maximum Queue (ft)	113	144	104	60	35
Average Queue (ft)	40	47	60	4	1
95th Queue (ft)	77	99	101	28	12
Link Distance (ft)	246	246		620	862
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)			0		
Queuing Penalty (veh)			3		

Network Summary

Network wide Queuing Penalty: 134

Major Street:	Highway 101
Minor Street:	Munsel Lake Road
Project Name:	Three Mile Prairie
City/County:	Florence / Lane
Analysis Year:	2026
Alternative:	No Build
Meet 70% Warrants?:	No
	100%

Major

Approach Lanes:	1

Minor

Approach Lanes:	1

Major

Approach Volumes (vph):	1565

Minor

Approach Volume (vph):	148
Right Turn Volume (vph):	50
Capacity of Shared/Exclusive Right Turn Lane[1]:	1619
Right Turn Discount:	1376
Right Turn Volume included in Warrant:	0
Minor Approach Volume in Warrant:	98

Major Approach K factor:	13.9
Minor Approach K factor:	8.23

[1] Capacity obtained from unsignalized intersection analysis
For guidance on preliminary signal warrant analysis, refer to the Analysis Procedures Manual.

Last Updated: January 2018

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Highway 101	**Minor Street:**	Munsel Lake Road
Project:	Three Mile Prairie	**City/County:**	Florence / Lane
Year:	2026	**Alternative:**	No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

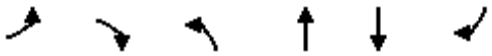
Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	11259	N
	Minor	1	2650	1191	
Case B	Major	1	13300	11259	N
	Minor	1	1350	1191	

M Weishar 10/08/20 | Reviewer and Date:

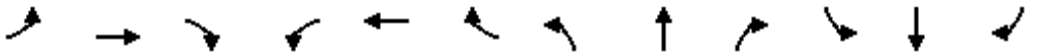
[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.



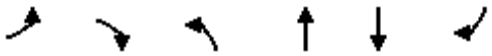
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	11	31	53	765	761	36
Future Volume (vph)	11	31	53	765	761	36
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	25			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.901				0.994	
Flt Protected	0.987		0.950			
Satd. Flow (prot)	1556	0	1884	1733	1723	0
Flt Permitted	0.987		0.950			
Satd. Flow (perm)	1556	0	1884	1733	1723	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	355			890	973	
Travel Time (s)	9.7			15.2	16.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	12	33	56	805	801	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	45	0	56	805	839	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 57.8%		ICU Level of Service B	
Analysis Period (min) 15			



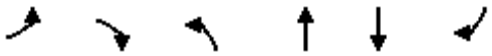
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	2	30	96	5	55	49	753	125	32	724	5
Future Volume (vph)	10	2	30	96	5	55	49	753	125	32	724	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	100		0	0		50	25		0	100		0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	75			25			25			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.859			0.952			0.979			0.999	
Flt Protected	0.950				0.970		0.950			0.950		
Satd. Flow (prot)	1662	1503	0	0	1616	0	1662	1699	0	1884	1731	0
Flt Permitted	0.950				0.970		0.950			0.950		
Satd. Flow (perm)	1662	1503	0	0	1616	0	1662	1699	0	1884	1731	0
Link Speed (mph)		25			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		7.4			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	2	32	101	5	58	52	793	132	34	762	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	34	0	0	164	0	52	925	0	34	767	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	204	85	90	773	735	149
Future Volume (vph)	204	85	90	773	735	149
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	50	0	25			75
Storage Lanes	1	1	1			1
Taper Length (ft)	50		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	20			40	40	
Link Distance (ft)	261			910	460	
Travel Time (s)	8.9			15.5	7.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	210	88	93	797	758	154
Shared Lane Traffic (%)						
Lane Group Flow (vph)	210	88	93	797	758	154
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 63.1%		ICU Level of Service B	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	34	215	230	825	784	33
Future Volume (vph)	34	215	230	825	784	33
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	100			76
Storage Lanes	1	1	1			1
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1473	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1473	1884	1733	3292	1488
Link Speed (mph)	25			40	40	
Link Distance (ft)	290			638	910	
Travel Time (s)	7.9			10.9	15.5	
Confl. Peds. (#/hr)		3				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	1%	1%	0%
Adj. Flow (vph)	35	219	235	842	800	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	35	219	235	842	800	34
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 58.1%		ICU Level of Service B	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	31	53	765	761	36
Future Vol, veh/h	11	31	53	765	761	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	12	33	56	805	801	38

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1737	820	839	0	-	0
Stage 1	820	-	-	-	-	-
Stage 2	917	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	97	378	804	-	-	-
Stage 1	436	-	-	-	-	-
Stage 2	393	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	90	378	804	-	-	-
Mov Cap-2 Maneuver	223	-	-	-	-	-
Stage 1	405	-	-	-	-	-
Stage 2	393	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	804	-	320	-	-
HCM Lane V/C Ratio	0.069	-	0.138	-	-
HCM Control Delay (s)	9.8	-	18	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	-	-

Intersection	
Int Delay, s/veh	50.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	2	30	96	5	55	49	753	125	32	724	5
Future Vol, veh/h	10	2	30	96	5	55	49	753	125	32	724	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	Free	-	-	None
Storage Length	100	-	-	-	-	-	25	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	11	2	32	101	5	58	52	793	132	34	762	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1733	1730	765	1747	1732	793	767	0	-	793	0	0
Stage 1	833	833	-	897	897	-	-	-	-	-	-	-
Stage 2	900	897	-	850	835	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	70	89	406	~ 68	89	392	856	-	0	837	-	-
Stage 1	366	386	-	337	361	-	-	-	0	-	-	-
Stage 2	336	361	-	358	386	-	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	52	80	406	~ 57	80	392	856	-	-	837	-	-
Mov Cap-2 Maneuver	52	80	-	~ 57	80	-	-	-	-	-	-	-
Stage 1	344	370	-	316	339	-	-	-	-	-	-	-
Stage 2	265	339	-	315	370	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	34.9	$ 552.3	0.6	0.4
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	856	-	52	324	84	837	-	-
HCM Lane V/C Ratio	0.06	-	0.202	0.104	1.955	0.04	-	-
HCM Control Delay (s)	9.5	-	91	17.4	$ 552.3	9.5	-	-
HCM Lane LOS	A	-	F	C	F	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.7	0.3	14.3	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	13.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	204	85	90	773	735	149
Future Vol, veh/h	204	85	90	773	735	149
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	50	0	25	-	-	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	210	88	93	797	758	154

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1741	379	758	0	-	0
Stage 1	758	-	-	-	-	-
Stage 2	983	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	~ 88	625	862	-	-	0
Stage 1	429	-	-	-	-	0
Stage 2	366	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 78	625	862	-	-	-
Mov Cap-2 Maneuver	~ 206	-	-	-	-	-
Stage 1	383	-	-	-	-	-
Stage 2	366	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	86	1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	862	-	206	625	-
HCM Lane V/C Ratio	0.108	-	1.021	0.14	-
HCM Control Delay (s)	9.7	-	116.9	11.7	-
HCM Lane LOS	A	-	F	B	-
HCM 95th %tile Q(veh)	0.4	-	9.2	0.5	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	34	215	230	825	784	33
Future Vol, veh/h	34	215	230	825	784	33
Conflicting Peds, #/hr	0	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	0	0	100	-	-	76
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	1	0	1	1	0
Mvmt Flow	35	219	235	842	800	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2112	403	800	0	-	0
Stage 1	800	-	-	-	-	-
Stage 2	1312	-	-	-	-	-
Critical Hdwy	6.6	6.915	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3095	2.2	-	-	-
Pot Cap-1 Maneuver	50	600	832	-	-	0
Stage 1	408	-	-	-	-	0
Stage 2	254	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	36	598	832	-	-	-
Mov Cap-2 Maneuver	141	-	-	-	-	-
Stage 1	293	-	-	-	-	-
Stage 2	254	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.8	2.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	832	-	141	598	-
HCM Lane V/C Ratio	0.282	-	0.246	0.367	-
HCM Control Delay (s)	11	-	38.7	14.5	-
HCM Lane LOS	B	-	E	B	-
HCM 95th %tile Q(veh)	1.2	-	0.9	1.7	-

Intersection: 1: Highway 101 & North Access

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	112	58
Average Queue (ft)	36	25
95th Queue (ft)	71	53
Link Distance (ft)	323	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		25
Storage Blk Time (%)		7
Queuing Penalty (veh)		50

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	EB	WB	NB	NB	SB
Directions Served	L	TR	LTR	L	TR	L
Maximum Queue (ft)	29	60	664	34	72	55
Average Queue (ft)	3	25	548	18	9	12
95th Queue (ft)	17	56	761	45	44	40
Link Distance (ft)		226	644		397	
Upstream Blk Time (%)			32			
Queuing Penalty (veh)			0			
Storage Bay Dist (ft)	100			25		100
Storage Blk Time (%)				3	1	
Queuing Penalty (veh)				29	0	

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	R
Maximum Queue (ft)	100	236	122	129	89
Average Queue (ft)	99	235	33	4	8
95th Queue (ft)	101	242	70	43	44
Link Distance (ft)		217		862	
Upstream Blk Time (%)		99			
Queuing Penalty (veh)		0			
Storage Bay Dist (ft)	50		25		75
Storage Blk Time (%)	100	1	8		0
Queuing Penalty (veh)	85	1	58		0

Intersection: 9: Highway 101 & 46th Street

Movement	EB	EB	NB	NB
Directions Served	L	R	L	T
Maximum Queue (ft)	138	251	109	60
Average Queue (ft)	38	49	50	2
95th Queue (ft)	96	134	93	20
Link Distance (ft)	246	246		620
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)			100	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			3	

Network Summary

Network wide Queuing Penalty: 228

Major Street:	Highway 101
Minor Street:	Munsel Lake Road
Project Name:	Three Mile Prairie
City/County:	Florence / Lane
Analysis Year:	2026
Alternative:	Build Three Mile Prairie
Meet 70% Warrants?:	No
	100%

Major	
Approach Lanes:	1
Minor	
Approach Lanes:	1
Major	
Approach Volumes (vph):	1683
Minor	
Approach Volume (vph):	156
Right Turn Volume (vph):	55
Capacity of Shared/Exclusive Right Turn Lane[1]:	1619
Right Turn Discount:	1376
Right Turn Volume included in Warrant:	0
Minor Approach Volume in Warrant:	101
Major Approach K factor:	13.9
Minor Approach K factor:	8.23

[1] Capacity obtained from unsignalized intersection analysis
For guidance on preliminary signal warrant analysis, refer to the Analysis Procedures Manual.

Last Updated: January 2018

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Highway 101	**Minor Street:**	Munsel Lake Road
Project:	Three Mile Prairie	**City/County:**	Florence / Lane
Year:	2026	**Alternative:**	Build Three Mile Prairie

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

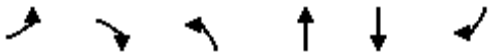
Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	12108	N
	Minor	1	2650	1227	
Case B	Major	1	13300	12108	N
	Minor	1	1350	1227	

M Weishar 10/08/20 | Reviewer and Date:

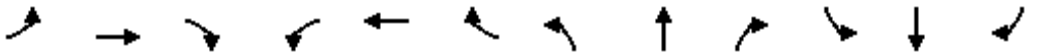
[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.



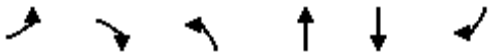
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	847	789	0
Future Volume (vph)	0	0	0	847	789	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	25			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1750	0	1983	1733	1733	0
Flt Permitted						
Satd. Flow (perm)	1750	0	1983	1733	1733	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	355			890	973	
Travel Time (s)	9.7			15.2	16.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	0	0	0	892	831	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	892	831	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 51.7%		ICU Level of Service A	
Analysis Period (min) 15			



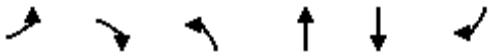
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	5	5	142	5	105	5	742	168	74	710	5
Future Volume (vph)	2	5	5	142	5	105	5	742	168	74	710	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	0		0	0		50	25		0	100		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.944			0.943			0.972			0.999	
Flt Protected		0.992			0.973		0.950			0.950		
Satd. Flow (prot)	0	1639	0	0	1606	0	1662	1687	0	1884	1731	0
Flt Permitted		0.992			0.973		0.950			0.950		
Satd. Flow (perm)	0	1639	0	0	1606	0	1662	1687	0	1884	1731	0
Link Speed (mph)		30			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		6.2			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	2	5	5	149	5	111	5	781	177	78	747	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	12	0	0	265	0	5	958	0	78	752	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	175	85	90	783	754	135
Future Volume (vph)	175	85	90	783	754	135
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	50	0	25			75
Storage Lanes	1	1	1			1
Taper Length (ft)	50		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	20			40	40	
Link Distance (ft)	261			600	460	
Travel Time (s)	8.9			10.2	7.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	180	88	93	807	777	139
Shared Lane Traffic (%)						
Lane Group Flow (vph)	180	88	93	807	777	139
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 61.9%		ICU Level of Service B	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	37	215	230	931	871	32
Future Volume (vph)	37	215	230	931	871	32
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	100			76
Storage Lanes	1	1	1			1
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1473	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1473	1884	1733	3292	1488
Link Speed (mph)	25			40	40	
Link Distance (ft)	290			638	310	
Travel Time (s)	7.9			10.9	5.3	
Confl. Peds. (#/hr)		3				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	1%	1%	0%
Adj. Flow (vph)	38	219	235	950	889	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	38	219	235	950	889	33
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 64.2%		ICU Level of Service C	
Analysis Period (min) 15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	82	37	836	128	20	819
Future Volume (vph)	82	37	836	128	20	819
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (ft)	100	0		0	50	
Storage Lanes	1	1		0	1	
Taper Length (ft)	75				50	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt		0.850	0.982			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1662	1488	1704	0	1662	3292
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1662	1488	1704	0	1662	3292
Link Speed (mph)	25		40			40
Link Distance (ft)	310		310			600
Travel Time (s)	8.5		5.3			10.2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Adj. Flow (vph)	86	39	880	135	21	862
Shared Lane Traffic (%)						
Lane Group Flow (vph)	86	39	1015	0	21	862
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		16			16
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	12		12			12
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	847	789	0
Future Vol, veh/h	0	0	0	847	789	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	0	0	0	892	831	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1723	831	831	0	-	0
Stage 1	831	-	-	-	-	-
Stage 2	892	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	99	373	810	-	-	-
Stage 1	431	-	-	-	-	-
Stage 2	404	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	99	373	810	-	-	-
Mov Cap-2 Maneuver	235	-	-	-	-	-
Stage 1	431	-	-	-	-	-
Stage 2	404	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	810	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	118.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	5	5	142	5	105	5	742	168	74	710	5
Future Vol, veh/h	2	5	5	142	5	105	5	742	168	74	710	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	-	25	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	2	5	5	149	5	111	5	781	177	78	747	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1700	1697	750	1702	1699	781	752	0	-	781	0	0
Stage 1	906	906	-	791	791	-	-	-	-	-	-	-
Stage 2	794	791	-	911	908	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	74	93	415	~ 73	93	398	867	-	0	845	-	-
Stage 1	333	358	-	386	404	-	-	-	0	-	-	-
Stage 2	384	404	-	331	357	-	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	47	84	415	~ 64	84	398	867	-	-	845	-	-
Mov Cap-2 Maneuver	47	84	-	~ 64	84	-	-	-	-	-	-	-
Stage 1	331	325	-	384	402	-	-	-	-	-	-	-
Stage 2	272	402	-	292	324	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	43.9	$ 838.6	0.1	0.9
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	867	-	105	100	845	-	-
HCM Lane V/C Ratio	0.006	-	0.12	2.653	0.092	-	-
HCM Control Delay (s)	9.2	-	43.9	$ 838.6	9.7	-	-
HCM Lane LOS	A	-	E	F	A	-	-
HCM 95th %tile Q(veh)	0	-	0.4	24.7	0.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	175	85	90	783	754	135
Future Vol, veh/h	175	85	90	783	754	135
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	50	0	25	-	-	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	180	88	93	807	777	139

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1770	389	777	0	-	0
Stage 1	777	-	-	-	-	-
Stage 2	993	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	~ 84	615	848	-	-	0
Stage 1	419	-	-	-	-	0
Stage 2	362	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 75	615	848	-	-	-
Mov Cap-2 Maneuver	202	-	-	-	-	-
Stage 1	373	-	-	-	-	-
Stage 2	362	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	62.3	1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	848	-	202	615	-
HCM Lane V/C Ratio	0.109	-	0.893	0.142	-
HCM Control Delay (s)	9.8	-	86.8	11.8	-
HCM Lane LOS	A	-	F	B	-
HCM 95th %tile Q(veh)	0.4	-	7	0.5	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	37	215	230	931	871	32
Future Vol, veh/h	37	215	230	931	871	32
Conflicting Peds, #/hr	0	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	0	0	100	-	-	76
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	1	0	1	1	0
Mvmt Flow	38	219	235	950	889	33

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2309	448	889	0	-	0
Stage 1	889	-	-	-	-	-
Stage 2	1420	-	-	-	-	-
Critical Hdwy	6.6	6.915	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3095	2.2	-	-	-
Pot Cap-1 Maneuver	~ 37	561	771	-	-	0
Stage 1	367	-	-	-	-	0
Stage 2	225	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 26	559	771	-	-	-
Mov Cap-2 Maneuver	121	-	-	-	-	-
Stage 1	255	-	-	-	-	-
Stage 2	225	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.2	2.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	771	-	121	559	-
HCM Lane V/C Ratio	0.304	-	0.312	0.392	-
HCM Control Delay (s)	11.7	-	47.7	15.5	-
HCM Lane LOS	B	-	E	C	-
HCM 95th %tile Q(veh)	1.3	-	1.2	1.9	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	82	37	836	128	20	819
Future Vol, veh/h	82	37	836	128	20	819
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	86	39	880	135	21	862

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1421	948	0	0	1015	0
Stage 1	948	-	-	-	-	-
Stage 2	473	-	-	-	-	-
Critical Hdwy	6.6	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	140	319	-	-	691	-
Stage 1	380	-	-	-	-	-
Stage 2	599	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	136	319	-	-	691	-
Mov Cap-2 Maneuver	268	-	-	-	-	-
Stage 1	380	-	-	-	-	-
Stage 2	581	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.6	0	0.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	268	319	691	-
HCM Lane V/C Ratio	-	-	0.322	0.122	0.03	-
HCM Control Delay (s)	-	-	24.7	17.8	10.4	-
HCM Lane LOS	-	-	C	C	B	-
HCM 95th %tile Q(veh)	-	-	1.3	0.4	0.1	-

Intersection: 1: Highway 101 & North Access

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	L
Maximum Queue (ft)	56	664	33	156	110
Average Queue (ft)	15	664	4	45	37
95th Queue (ft)	42	667	22	125	78
Link Distance (ft)	226	645		403	
Upstream Blk Time (%)		100			
Queuing Penalty (veh)		0			
Storage Bay Dist (ft)			25		100
Storage Blk Time (%)			1	4	1
Queuing Penalty (veh)			5	0	4

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	100	236	61	45
Average Queue (ft)	99	236	32	3
95th Queue (ft)	101	237	57	22
Link Distance (ft)		217		
Upstream Blk Time (%)		99		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)	50		25	75
Storage Blk Time (%)	100	2	5	
Queuing Penalty (veh)	85	3	40	

Intersection: 9: Highway 101 & 46th Street

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	T
Maximum Queue (ft)	256	265	115	34	35
Average Queue (ft)	121	71	60	1	1
95th Queue (ft)	242	183	101	11	12
Link Distance (ft)	246	246		620	251
Upstream Blk Time (%)	6	7			
Queuing Penalty (veh)	0	0			
Storage Bay Dist (ft)			100		
Storage Blk Time (%)			1		
Queuing Penalty (veh)			9		

Intersection: 12: Highway 101 & 47th Street

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	L
Maximum Queue (ft)	175	221	26	34
Average Queue (ft)	70	44	0	18
95th Queue (ft)	148	127	0	42
Link Distance (ft)		278	251	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	100			50
Storage Blk Time (%)	14			0
Queuing Penalty (veh)	6			0

Network Summary

Network wide Queuing Penalty: 153

Major Street:	Highway 101
Minor Street:	Munsel Lake Road
Project Name:	Three Mile Prairie
City/County:	Florence / Lane
Analysis Year:	2026
Alternative:	Build Cannery Station
Meet 70% Warrants?:	No
	100%

Major	
Approach Lanes:	1
Minor	
Approach Lanes:	1
Major	
Approach Volumes (vph):	1704
Minor	
Approach Volume (vph):	249
Right Turn Volume (vph):	105
Capacity of Shared/Exclusive Right Turn Lane[1]:	1619
Right Turn Discount:	1376
Right Turn Volume included in Warrant:	0
Minor Approach Volume in Warrant:	144
Major Approach K factor:	13.9
Minor Approach K factor:	8.23

[1] Capacity obtained from unsignalized intersection analysis
For guidance on preliminary signal warrant analysis, refer to the Analysis Procedures Manual.

Last Updated: January 2018

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Highway 101	**Minor Street:**	Munsel Lake Road
Project:	Three Mile Prairie	**City/County:**	Florence / Lane
Year:	2026	**Alternative:**	Build Cannery Station

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

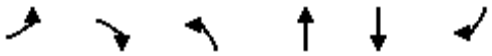
Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	12259	N
	Minor	1	2650	1750	
Case B	Major	1	13300	12259	N
	Minor	1	1350	1750	

M Weishar 10/08/20 | Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

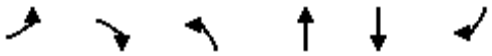


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	11	31	53	857	820	36
Future Volume (vph)	11	31	53	857	820	36
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	25			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.901				0.994	
Flt Protected	0.987		0.950			
Satd. Flow (prot)	1556	0	1884	1733	1723	0
Flt Permitted	0.987		0.950			
Satd. Flow (perm)	1556	0	1884	1733	1723	0
Link Speed (mph)	25			40	40	
Link Distance (ft)	355			890	973	
Travel Time (s)	9.7			15.2	16.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	12	33	56	902	863	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	45	0	56	902	901	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 59.2%		ICU Level of Service B	
Analysis Period (min) 15			

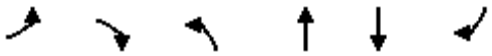
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	2	30	142	5	110	49	790	168	76	739	1
Future Volume (vph)	10	2	30	142	5	110	49	790	168	76	739	1
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	100		0	0		50	25		0	100		0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	75			25			25			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.859			0.942			0.974				
Flt Protected	0.950				0.973		0.950			0.950		
Satd. Flow (prot)	1662	1503	0	0	1604	0	1662	1691	0	1884	1733	0
Flt Permitted	0.950				0.973		0.950			0.950		
Satd. Flow (perm)	1662	1503	0	0	1604	0	1662	1691	0	1884	1733	0
Link Speed (mph)		30			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		6.2			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	2	32	149	5	116	52	832	177	80	778	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	34	0	0	270	0	52	1009	0	80	779	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 93.6%		ICU Level of Service F	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	204	85	90	853	799	149
Future Volume (vph)	204	85	90	853	799	149
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	50	0	25			75
Storage Lanes	1	1	1			1
Taper Length (ft)	50		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1488	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1488	1884	1733	3292	1488
Link Speed (mph)	20			40	40	
Link Distance (ft)	261			600	460	
Travel Time (s)	8.9			10.2	7.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	210	88	93	879	824	154
Shared Lane Traffic (%)						
Lane Group Flow (vph)	210	88	93	879	824	154
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 67.7%		ICU Level of Service C	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	41	215	230	990	908	35
Future Volume (vph)	41	215	230	990	908	35
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	16	12	12	12
Storage Length (ft)	0	0	100			76
Storage Lanes	1	1	1			1
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1662	1473	1884	1733	3292	1488
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1662	1473	1884	1733	3292	1488
Link Speed (mph)	25			40	40	
Link Distance (ft)	290			638	310	
Travel Time (s)	7.9			10.9	5.3	
Confl. Peds. (#/hr)		3				
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	1%	0%	1%	1%	0%
Adj. Flow (vph)	42	219	235	1010	927	36
Shared Lane Traffic (%)						
Lane Group Flow (vph)	42	219	235	1010	927	36
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			16	16	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	12			12	12	
Two way Left Turn Lane				Yes	Yes	
Headway Factor	1.11	1.11	0.95	1.11	1.11	1.11
Turning Speed (mph)	15	15	15			15
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 67.5%		ICU Level of Service C	
Analysis Period (min) 15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	82	41	900	128	23	859
Future Volume (vph)	82	41	900	128	23	859
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (ft)	100	0		0	50	
Storage Lanes	1	1		0	1	
Taper Length (ft)	75				50	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt		0.850	0.983			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1662	1488	1705	0	1662	3292
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1662	1488	1705	0	1662	3292
Link Speed (mph)	25		40			40
Link Distance (ft)	310		310			600
Travel Time (s)	8.5		5.3			10.2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Adj. Flow (vph)	86	43	947	135	24	904
Shared Lane Traffic (%)						
Lane Group Flow (vph)	86	43	1082	0	24	904
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		16			16
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	12		12			12
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	31	53	857	820	36
Future Vol, veh/h	11	31	53	857	820	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	12	33	56	902	863	38

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1896	882	901	0	-	0
Stage 1	882	-	-	-	-	-
Stage 2	1014	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	77	348	763	-	-	-
Stage 1	408	-	-	-	-	-
Stage 2	353	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	71	348	763	-	-	-
Mov Cap-2 Maneuver	199	-	-	-	-	-
Stage 1	378	-	-	-	-	-
Stage 2	353	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.6	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	763	-	291	-	-
HCM Lane V/C Ratio	0.073	-	0.152	-	-
HCM Control Delay (s)	10.1	-	19.6	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	-	-

Intersection	
Int Delay, s/veh	187.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	2	30	142	5	110	49	790	168	76	739	1
Future Vol, veh/h	10	2	30	142	5	110	49	790	168	76	739	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	Free	-	-	None
Storage Length	100	-	-	-	-	-	25	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	11	2	32	149	5	116	52	832	177	80	778	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1878	1875	779	1892	1875	832	779	0	-	832	0	0
Stage 1	939	939	-	936	936	-	-	-	-	-	-	-
Stage 2	939	936	-	956	939	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	55	73	399	~ 54	73	372	847	-	0	809	-	-
Stage 1	320	345	-	321	346	-	-	-	0	-	-	-
Stage 2	320	346	-	313	345	-	-	-	0	-	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver	31	62	399	~ 43	62	372	847	-	-	809	-	-
Mov Cap-2 Maneuver	31	62	-	~ 43	62	-	-	-	-	-	-	-
Stage 1	300	311	-	301	325	-	-	-	-	-	-	-
Stage 2	204	325	-	258	311	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	55.1	$ 1411.5	0.6	0.9
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	847	-	31	298	70	809	-	-
HCM Lane V/C Ratio	0.061	-	0.34	0.113	3.865	0.099	-	-
HCM Control Delay (s)	9.5	-	172.1	18.8	$ 1411.5	9.9	-	-
HCM Lane LOS	A	-	F	C	F	A	-	-
HCM 95th %tile Q(veh)	0.2	-	1.1	0.4	28.6	0.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	17.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	204	85	90	853	799	149
Future Vol, veh/h	204	85	90	853	799	149
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	50	0	25	-	-	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	210	88	93	879	824	154

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1889	412	824	0	-	0
Stage 1	824	-	-	-	-	-
Stage 2	1065	-	-	-	-	-
Critical Hdwy	6.6	6.9	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	~ 70	595	815	-	-	0
Stage 1	396	-	-	-	-	0
Stage 2	334	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 62	595	815	-	-	-
Mov Cap-2 Maneuver	~ 184	-	-	-	-	-
Stage 1	351	-	-	-	-	-
Stage 2	334	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	118	1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	815	-	184	595	-
HCM Lane V/C Ratio	0.114	-	1.143	0.147	-
HCM Control Delay (s)	10	-	162.1	12.1	-
HCM Lane LOS	A	-	F	B	-
HCM 95th %tile Q(veh)	0.4	-	10.7	0.5	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	41	215	230	990	908	35
Future Vol, veh/h	41	215	230	990	908	35
Conflicting Peds, #/hr	0	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	Free
Storage Length	0	0	100	-	-	76
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	1	0	1	1	0
Mvmt Flow	42	219	235	1010	927	36

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2407	467	927	0	-	0
Stage 1	927	-	-	-	-	-
Stage 2	1480	-	-	-	-	-
Critical Hdwy	6.6	6.915	4.1	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3095	2.2	-	-	-
Pot Cap-1 Maneuver	~ 32	546	746	-	-	0
Stage 1	351	-	-	-	-	0
Stage 2	211	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 22	544	746	-	-	-
Mov Cap-2 Maneuver	112	-	-	-	-	-
Stage 1	240	-	-	-	-	-
Stage 2	211	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.3	2.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	746	-	112	544	-
HCM Lane V/C Ratio	0.315	-	0.374	0.403	-
HCM Control Delay (s)	12	-	55.2	16	-
HCM Lane LOS	B	-	F	C	-
HCM 95th %tile Q(veh)	1.3	-	1.5	1.9	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	82	41	900	128	23	859
Future Vol, veh/h	82	41	900	128	23	859
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	86	43	947	135	24	904

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1515	1015	0	0	1082	0
Stage 1	1015	-	-	-	-	-
Stage 2	500	-	-	-	-	-
Critical Hdwy	6.6	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	122	292	-	-	652	-
Stage 1	353	-	-	-	-	-
Stage 2	580	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	117	292	-	-	652	-
Mov Cap-2 Maneuver	247	-	-	-	-	-
Stage 1	353	-	-	-	-	-
Stage 2	559	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.6	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	247	292	652	-
HCM Lane V/C Ratio	-	-	0.349	0.148	0.037	-
HCM Control Delay (s)	-	-	27.2	19.5	10.7	-
HCM Lane LOS	-	-	D	C	B	-
HCM 95th %tile Q(veh)	-	-	1.5	0.5	0.1	-

Intersection: 1: Highway 101 & North Access

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	86	58
Average Queue (ft)	38	27
95th Queue (ft)	73	50
Link Distance (ft)	323	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		25
Storage Blk Time (%)		8
Queuing Penalty (veh)		70

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	L	TR
Maximum Queue (ft)	29	60	664	46	123	84	99
Average Queue (ft)	10	24	662	18	31	34	3
95th Queue (ft)	31	53	671	46	93	69	33
Link Distance (ft)		226	644		397		841
Upstream Blk Time (%)			100				
Queuing Penalty (veh)			0				
Storage Bay Dist (ft)	100			25		100	
Storage Blk Time (%)				4	2	0	0
Queuing Penalty (veh)				34	1	0	0

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	100	236	61	48
Average Queue (ft)	99	234	29	5
95th Queue (ft)	103	243	56	28
Link Distance (ft)		217		
Upstream Blk Time (%)		100		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)	50		25	75
Storage Blk Time (%)	100	0	6	
Queuing Penalty (veh)	85	1	52	

Intersection: 9: Highway 101 & 46th Street

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T
Maximum Queue (ft)	113	110	158	108	35	35
Average Queue (ft)	57	46	67	6	1	2
95th Queue (ft)	109	95	110	43	12	16
Link Distance (ft)	246	246		620	251	251
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			100			
Storage Blk Time (%)			2	0		
Queuing Penalty (veh)			15	0		

Intersection: 12: Highway 101 & 47th Street

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	L
Maximum Queue (ft)	160	153	26	35
Average Queue (ft)	66	39	1	14
95th Queue (ft)	120	100	9	39
Link Distance (ft)		278	251	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	100			50
Storage Blk Time (%)	7	0		0
Queuing Penalty (veh)	3	0		1

Network Summary

Network wide Queuing Penalty: 262

Major Street:	Highway 101
Minor Street:	Munsel Lake Road
Project Name:	Three Mile Prairie
City/County:	Florence / Lane
Analysis Year:	2026
Alternative:	Build 3 Mile Pr + Cannery Sta
Meet 70% Warrants?:	No
	100%

Major	
Approach Lanes:	1
Minor	
Approach Lanes:	1
Major	
Approach Volumes (vph):	1822
Minor	
Approach Volume (vph):	257
Right Turn Volume (vph):	110
Capacity of Shared/Exclusive Right Turn Lane[1]:	1619
Right Turn Discount:	1376
Right Turn Volume included in Warrant:	0
Minor Approach Volume in Warrant:	147
Major Approach K factor:	13.9
Minor Approach K factor:	8.23

[1] Capacity obtained from unsignalized intersection analysis
For guidance on preliminary signal warrant analysis, refer to the Analysis Procedures Manual.

Last Updated: January 2018

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Highway 101	**Minor Street:**	Munsel Lake Road
Project:	Three Mile Prairie	**City/County:**	Florence / Lane
Year:	2026	**Alternative:**	Build 3 Mile Pr + Cannery Sta

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

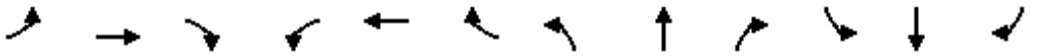
Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	13108	N
	Minor	1	2650	1786	
Case B	Major	1	13300	13108	N
	Minor	1	1350	1786	

M Weishar 10/08/20 | Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. When preliminary signal warrants are met, project analysts need to coordinate with Region Traffic to initiate the traffic signal engineering investigation as outlined in the Traffic Manual. Before a signal can be installed, the engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward signal recommendations to headquarters. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be installed on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

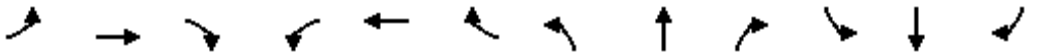


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	2	30	96	5	55	49	753	125	32	724	5
Future Volume (vph)	10	2	30	96	5	55	49	753	125	32	724	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	100		0	0		50	100		0	100		0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	75			100			75			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.859			0.952			0.979			0.999	
Flt Protected	0.950				0.970		0.950			0.950		
Satd. Flow (prot)	1662	1503	0	0	1616	0	1662	1699	0	1884	1731	0
Flt Permitted	0.656				0.792		0.225			0.156		
Satd. Flow (perm)	1148	1503	0	0	1319	0	394	1699	0	309	1731	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		7.4			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	2	32	101	5	58	52	793	132	34	762	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	34	0	0	164	0	52	925	0	34	767	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Number of Detectors	2	2		2	2		2	2		2	2	
Detector Template												
Leading Detector (ft)	78	78		78	223		78	323		92	323	
Trailing Detector (ft)	2	2		2	107		2	157		2	157	
Detector 1 Position(ft)	2	2		2	107		2	157		2	157	
Detector 1 Size(ft)	20	20		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)	72	72		72	217		72	317		72	317	
Detector 2 Size(ft)	6	6		6	6		6	6		20	6	
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	32.0	32.0		32.5	32.5		13.0	36.8		13.0	36.8	
Total Split (s)	32.5	32.5		32.5	32.5		13.0	44.5		13.0	44.5	
Total Split (%)	36.1%	36.1%		36.1%	36.1%		14.4%	49.4%		14.4%	49.4%	
Maximum Green (s)	28.5	28.5		28.0	28.0		9.0	39.7		9.0	39.7	
Yellow Time (s)	3.5	3.5		4.0	4.0		3.5	4.3		3.5	4.3	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0			4.5		4.0	4.8		4.0	4.8	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0		2.5	4.0	
Minimum Gap (s)	2.0	2.0		2.0	2.0		2.0	2.7		2.0	2.7	
Time Before Reduce (s)	8.0	8.0		8.0	8.0		8.0	10.0		8.0	10.0	
Time To Reduce (s)	4.0	4.0		4.0	4.0		4.0	13.0		4.0	13.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0			12.0			15.0	
Pedestrian Calls (#/hr)	1	1		1	1			1			1	
Act Effct Green (s)	12.6	12.6			12.1		48.8	45.6		47.3	43.3	
Actuated g/C Ratio	0.18	0.18			0.17		0.69	0.64		0.67	0.61	
v/c Ratio	0.05	0.13			0.73		0.14	0.84		0.10	0.72	
Control Delay	23.7	24.5			46.0		5.3	23.7		5.3	18.6	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	23.7	24.5			46.0		5.3	23.7		5.3	18.6	
LOS	C	C			D		A	C		A	B	
Approach Delay		24.3			46.0			22.7			18.1	
Approach LOS		C			D			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 70.7			
Natural Cycle: 105			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 22.8		Intersection LOS: C	
Intersection Capacity Utilization 75.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Highway 101 & Munsel Lake Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	2	30	96	5	55	49	753	125	32	724	5
Future Volume (vph)	10	2	30	96	5	55	49	753	125	32	724	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	12	12	12	12	12	12	12	12	12	16	12	12
Total Lost time (s)	4.0	4.0			4.5		4.0	4.8		4.0	4.8	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86			0.95		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	1503			1617		1662	1698		1884	1731	
Flt Permitted	0.66	1.00			0.79		0.22	1.00		0.16	1.00	
Satd. Flow (perm)	1148	1503			1320		394	1698		310	1731	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	11	2	32	101	5	58	52	793	132	34	762	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	11	34	0	0	164	0	52	925	0	34	767	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.6	12.6			12.1		49.2	45.6		46.2	44.1	
Effective Green, g (s)	12.6	12.6			12.1		49.2	45.6		46.2	44.1	
Actuated g/C Ratio	0.17	0.17			0.17		0.67	0.62		0.63	0.60	
Clearance Time (s)	4.0	4.0			4.5		4.0	4.8		4.0	4.8	
Vehicle Extension (s)	2.5	2.5			2.5		2.5	4.0		2.5	4.0	
Lane Grp Cap (vph)	197	259			218		327	1059		241	1044	
v/s Ratio Prot		0.02					c0.01	c0.54		0.00	0.44	
v/s Ratio Perm	0.01				c0.12		0.10			0.09		
v/c Ratio	0.06	0.13			0.75		0.16	0.87		0.14	0.73	
Uniform Delay, d1	25.3	25.6			29.1		6.5	11.4		8.8	10.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.2			13.0		0.2	8.4		0.2	2.9	
Delay (s)	25.4	25.8			42.1		6.7	19.7		9.0	13.2	
Level of Service	C	C			D		A	B		A	B	
Approach Delay (s)		25.7			42.1			19.0			13.1	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	73.1	Sum of lost time (s)	13.3
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	2	30	96	5	55	49	753	125	32	724	5
Future Volume (veh/h)	10	2	30	96	5	55	49	753	125	32	724	5
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1750	1750	1750	1750	1750	1750	1750	1735	1750	1820	1733	1750
Adj Flow Rate, veh/h	11	2	32	101	5	0	52	793	0	34	762	5
Adj No. of Lanes	1	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	1	1	0	1	1
Cap, veh/h	321	11	182	258	10	0	406	1094	0	395	1067	7
Arrive On Green	0.13	0.13	0.13	0.13	0.13	0.00	0.04	0.63	0.00	0.03	0.62	0.62
Sat Flow, veh/h	1434	88	1412	1132	78	0	1667	1735	0	1733	1720	11
Grp Volume(v), veh/h	11	0	34	106	0	0	52	793	0	34	0	767
Grp Sat Flow(s),veh/h/ln	1434	0	1501	1210	0	0	1667	1735	0	1733	0	1731
Q Serve(g_s), s	0.0	0.0	1.3	4.4	0.0	0.0	0.7	19.5	0.0	0.4	0.0	18.9
Cycle Q Clear(g_c), s	0.4	0.0	1.3	5.7	0.0	0.0	0.7	19.5	0.0	0.4	0.0	18.9
Prop In Lane	1.00		0.94	0.95		0.00	1.00		0.00	1.00		0.01
Lane Grp Cap(c), veh/h	321	0	193	268	0	0	406	1094	0	395	0	1074
V/C Ratio(X)	0.03	0.00	0.18	0.40	0.00	0.00	0.13	0.73	0.00	0.09	0.00	0.71
Avail Cap(c_a), veh/h	789	0	684	718	0	0	582	1101	0	595	0	1098
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.9	0.0	24.3	26.7	0.0	0.0	6.8	7.9	0.0	6.9	0.0	8.1
Incr Delay (d2), s/veh	0.0	0.0	0.3	0.7	0.0	0.0	0.1	2.6	0.0	0.1	0.0	2.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.5	1.8	0.0	0.0	0.3	9.8	0.0	0.2	0.0	9.4
LnGrp Delay(d),s/veh	23.9	0.0	24.6	27.4	0.0	0.0	6.9	10.5	0.0	7.0	0.0	10.5
LnGrp LOS	C		C	C			A	B		A		B
Approach Vol, veh/h		45			106			845			801	
Approach Delay, s/veh		24.5			27.4			10.3			10.3	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.8	44.2		12.5	6.4	43.6		12.5
Change Period (Y+Rc), s	4.0	4.8		* 4.5	4.0	4.8		4.5
Max Green Setting (Gmax), s	9.0	39.7		* 29	9.0	39.7		28.0
Max Q Clear Time (g_c+I1), s	2.4	21.5		3.3	2.7	20.9		7.7
Green Ext Time (p_c), s	0.0	17.4		1.1	0.0	18.0		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	11.7
HCM 2010 LOS	B

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1: Highway 101 & North Access

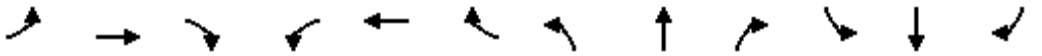
Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	60	61
Average Queue (ft)	33	26
95th Queue (ft)	60	53
Link Distance (ft)	323	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		25
Storage Blk Time (%)		6
Queuing Penalty (veh)		49

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	L	TR
Maximum Queue (ft)	29	58	198	174	398	33	264
Average Queue (ft)	7	20	79	29	135	18	96
95th Queue (ft)	28	50	152	82	301	43	190
Link Distance (ft)		226	644		397		841
Upstream Blk Time (%)					1		
Queuing Penalty (veh)					14		
Storage Bay Dist (ft)	100			100		100	
Storage Blk Time (%)					8		4
Queuing Penalty (veh)					4		1

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	R
Maximum Queue (ft)	100	236	123	215	48
Average Queue (ft)	98	232	40	18	6
95th Queue (ft)	102	243	73	108	32
Link Distance (ft)		217		862	
Upstream Blk Time (%)		100			
Queuing Penalty (veh)		0			
Storage Bay Dist (ft)	50		25		75
Storage Blk Time (%)	100	0	10	3	
Queuing Penalty (veh)	85	1	79	2	

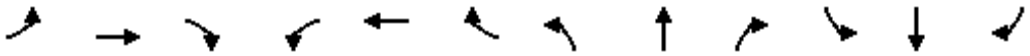


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	5	5	142	5	105	5	742	168	74	710	5
Future Volume (vph)	2	5	5	142	5	105	5	742	168	74	710	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	0		0	250		50	25		0	100		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			100			25			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.944			0.856			0.972			0.999	
Flt Protected		0.992		0.950			0.950			0.950		
Satd. Flow (prot)	0	1639	0	1662	1498	0	1662	1687	0	1884	1731	0
Flt Permitted		0.963		0.750			0.296			0.099		
Satd. Flow (perm)	0	1591	0	1312	1498	0	518	1687	0	196	1731	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		7.4			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	2	5	5	149	5	111	5	781	177	78	747	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	12	0	149	116	0	5	958	0	78	752	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Number of Detectors	1	2		2	2		2	2		2	2	
Detector Template	Left											
Leading Detector (ft)	20	78		92	223		78	323		78	323	
Trailing Detector (ft)	0	2		2	107		2	157		2	157	
Detector 1 Position(ft)	0	2		2	107		2	157		2	157	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		72		72	217		72	317		72	317	
Detector 2 Size(ft)		6		20	6		6	6		6	6	
Detector 2 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	32.0	32.0		32.5	32.5		13.0	36.8		13.0	33.8	
Total Split (s)	32.5	32.5		32.5	32.5		13.0	44.5		13.0	44.5	
Total Split (%)	36.1%	36.1%		36.1%	36.1%		14.4%	49.4%		14.4%	49.4%	
Maximum Green (s)	28.5	28.5		28.0	28.0		9.0	39.7		9.0	39.7	
Yellow Time (s)	3.5	3.5		4.0	4.0		3.5	4.3		3.5	4.3	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0		4.5	4.5		4.0	4.8		4.0	4.8	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0		2.5	4.0	
Minimum Gap (s)	2.0	2.0		2.0	2.0		2.0	2.7		2.0	2.7	
Time Before Reduce (s)	8.0	8.0		8.0	8.0		8.0	10.0		8.0	10.0	
Time To Reduce (s)	4.0	4.0		4.0	4.0		4.0	13.0		4.0	13.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0			15.0			12.0	
Pedestrian Calls (#/hr)	1	1		1	1			1			1	
Act Effct Green (s)		12.4		11.9	11.9		47.4	42.6		51.2	49.0	
Actuated g/C Ratio		0.17		0.17	0.17		0.66	0.59		0.71	0.68	
v/c Ratio		0.04		0.69	0.47		0.01	0.96		0.28	0.64	
Control Delay		23.5		44.4	32.8		4.8	39.5		6.8	12.8	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		23.5		44.4	32.8		4.8	39.5		6.8	12.8	
LOS		C		D	C		A	D		A	B	
Approach Delay		23.5			39.4			39.3			12.2	
Approach LOS		C			D			D			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 71.9			
Natural Cycle: 115			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 28.4		Intersection LOS: C	
Intersection Capacity Utilization 84.2%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Highway 101 & Munsel Lake Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	5	5	142	5	105	5	742	168	74	710	5
Future Volume (vph)	2	5	5	142	5	105	5	742	168	74	710	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	12	12	12	12	12	12	12	12	12	16	12	12
Total Lost time (s)		4.0		4.5	4.5		4.0	4.8		4.0	4.8	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt		0.94		1.00	0.86		1.00	0.97		1.00	1.00	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1638		1662	1499		1662	1688		1884	1731	
Flt Permitted		0.96		0.75	1.00		0.30	1.00		0.10	1.00	
Satd. Flow (perm)		1591		1312	1499		518	1688		197	1731	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	5	5	149	5	111	5	781	177	78	747	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	12	0	149	116	0	5	958	0	78	752	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.4		11.9	11.9		45.9	45.0		53.9	49.0	
Effective Green, g (s)		12.4		11.9	11.9		45.9	45.0		53.9	49.0	
Actuated g/C Ratio		0.17		0.16	0.16		0.61	0.60		0.72	0.65	
Clearance Time (s)		4.0		4.5	4.5		4.0	4.8		4.0	4.8	
Vehicle Extension (s)		2.5		2.5	2.5		2.5	4.0		2.5	4.0	
Lane Grp Cap (vph)		262		207	237		330	1011		251	1129	
v/s Ratio Prot					0.08		0.00	c0.57		c0.02	c0.43	
v/s Ratio Perm		0.01		c0.11			0.01			0.20		
v/c Ratio		0.05		0.72	0.49		0.02	0.95		0.31	0.67	
Uniform Delay, d1		26.4		30.0	28.8		6.4	14.0		11.6	8.0	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1		10.6	1.2		0.0	17.1		0.5	1.6	
Delay (s)		26.4		40.6	30.0		6.4	31.0		12.2	9.7	
Level of Service		C		D	C		A	C		B	A	
Approach Delay (s)		26.4			36.0			30.9			9.9	
Approach LOS		C			D			C			A	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	75.1	Sum of lost time (s)	13.3
Intersection Capacity Utilization	84.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	5	5	142	5	105	5	742	168	74	710	5
Future Volume (veh/h)	2	5	5	142	5	105	5	742	168	74	710	5
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1750	1750	1750	1750	1750	1750	1750	1736	1750	1820	1733	1750
Adj Flow Rate, veh/h	2	5	5	149	5	0	5	781	0	78	747	5
Adj No. of Lanes	0	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	1	1	0	1	1
Cap, veh/h	80	113	90	307	234	0	397	1053	0	405	1115	7
Arrive On Green	0.13	0.13	0.13	0.13	0.13	0.00	0.01	0.61	0.00	0.05	0.65	0.65
Sat Flow, veh/h	95	844	671	1427	1750	0	1667	1736	0	1733	1719	12
Grp Volume(v), veh/h	12	0	0	149	5	0	5	781	0	78	0	752
Grp Sat Flow(s),veh/h/ln	1611	0	0	1427	1750	0	1667	1736	0	1733	0	1731
Q Serve(g_s), s	0.0	0.0	0.0	5.8	0.2	0.0	0.1	20.1	0.0	1.0	0.0	16.9
Cycle Q Clear(g_c), s	0.4	0.0	0.0	6.2	0.2	0.0	0.1	20.1	0.0	1.0	0.0	16.9
Prop In Lane	0.17		0.42	1.00		0.00	1.00		0.00	1.00		0.01
Lane Grp Cap(c), veh/h	282	0	0	307	234	0	397	1053	0	405	0	1123
V/C Ratio(X)	0.04	0.00	0.00	0.49	0.02	0.00	0.01	0.74	0.00	0.19	0.00	0.67
Avail Cap(c_a), veh/h	789	0	0	755	783	0	628	1101	0	572	0	1123
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.7	0.0	0.0	26.2	23.6	0.0	6.4	8.8	0.0	7.6	0.0	6.8
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.9	0.0	0.0	0.0	2.9	0.0	0.2	0.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.0	2.6	0.1	0.0	0.0	10.4	0.0	0.5	0.0	8.5
LnGrp Delay(d),s/veh	23.7	0.0	0.0	27.1	23.6	0.0	6.4	11.7	0.0	7.7	0.0	8.6
LnGrp LOS	C			C	C		A	B		A		A
Approach Vol, veh/h		12			154			786			830	
Approach Delay, s/veh		23.7			27.0			11.6			8.5	
Approach LOS		C			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.0	42.8		12.9	4.3	45.4		12.9
Change Period (Y+Rc), s	4.0	4.8		* 4.5	4.0	4.8		4.5
Max Green Setting (Gmax), s	9.0	39.7		* 29	9.0	39.7		28.0
Max Q Clear Time (g_c+I1), s	3.0	22.1		2.4	2.1	18.9		8.2
Green Ext Time (p_c), s	0.1	15.8		0.7	0.0	19.7		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	11.6
HCM 2010 LOS	B

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1: Highway 101 & North Access

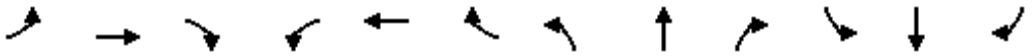
Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	TR	L	TR	L	TR
Maximum Queue (ft)	34	155	125	49	399	174	429
Average Queue (ft)	12	77	26	7	246	52	160
95th Queue (ft)	37	122	86	31	413	126	320
Link Distance (ft)	227		644		397		842
Upstream Blk Time (%)					1		
Queuing Penalty (veh)					8		
Storage Bay Dist (ft)		250		25		100	
Storage Blk Time (%)				2	35	0	10
Queuing Penalty (veh)				18	2	0	7

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	R
Maximum Queue (ft)	100	236	60	124	47
Average Queue (ft)	98	233	29	12	3
95th Queue (ft)	103	243	52	61	22
Link Distance (ft)		217		552	
Upstream Blk Time (%)		99			
Queuing Penalty (veh)		0			
Storage Bay Dist (ft)	50		25		75
Storage Blk Time (%)	100	1	7	1	
Queuing Penalty (veh)	85	2	51	1	

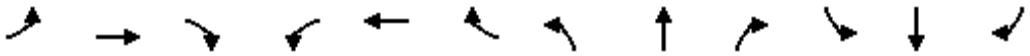


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	2	30	142	5	110	49	790	168	76	739	1
Future Volume (vph)	10	2	30	142	5	110	49	790	168	76	739	1
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	100		0	250		50	75		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	75			100			50			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.859			0.856			0.974				
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1662	1503	0	1662	1498	0	1662	1691	0	1884	1733	0
Flt Permitted	0.672			0.735			0.247			0.089		
Satd. Flow (perm)	1176	1503	0	1286	1498	0	432	1691	0	177	1733	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		7.4			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	2	32	149	5	116	52	832	177	80	778	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	34	0	149	121	0	52	1009	0	80	779	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Number of Detectors	2	2		2	2		2	2		2	2	
Detector Template												
Leading Detector (ft)	78	78		78	223		78	323		78	323	
Trailing Detector (ft)	2	2		2	107		2	157		2	157	
Detector 1 Position(ft)	2	2		2	107		2	157		2	157	
Detector 1 Size(ft)	20	20		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)	72	72		72	217		72	317		72	317	
Detector 2 Size(ft)	6	6		6	6		6	6		6	6	
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	32.0	32.0		32.5	32.5		9.5	36.8		9.5	36.8	
Total Split (s)	32.5	32.5		32.5	32.5		9.5	48.0		9.5	48.0	
Total Split (%)	36.1%	36.1%		36.1%	36.1%		10.6%	53.3%		10.6%	53.3%	
Maximum Green (s)	28.5	28.5		28.0	28.0		5.5	43.2		5.5	43.2	
Yellow Time (s)	3.5	3.5		4.0	4.0		3.5	4.3		3.5	4.3	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.5	4.5		4.0	4.8		4.0	4.8	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0		2.5	4.0	
Minimum Gap (s)	2.0	2.0		2.0	2.0		2.0	2.7		2.0	2.7	
Time Before Reduce (s)	8.0	8.0		8.0	8.0		8.0	10.0		8.0	10.0	
Time To Reduce (s)	4.0	4.0		4.0	4.0		4.0	13.0		4.0	13.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0			15.0			15.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)	12.1	12.1		11.6	11.6		50.8	45.7		51.7	47.7	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.69	0.62		0.70	0.64	
v/c Ratio	0.06	0.14		0.74	0.52		0.14	0.97		0.32	0.70	
Control Delay	25.5	26.8		51.6	36.3		4.7	39.7		7.7	16.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.5	26.8		51.6	36.3		4.7	39.7		7.7	16.0	
LOS	C	C		D	D		A	D		A	B	
Approach Delay		26.4			44.7			37.9			15.2	
Approach LOS		C			D			D			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 74.1			
Natural Cycle: 110			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.97			
Intersection Signal Delay: 29.8		Intersection LOS: C	
Intersection Capacity Utilization 87.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 2: Highway 101 & Munsel Lake Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	2	30	142	5	110	49	790	168	76	739	1
Future Volume (vph)	10	2	30	142	5	110	49	790	168	76	739	1
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	12	12	12	12	12	12	12	12	12	16	12	12
Total Lost time (s)	4.0	4.0		4.5	4.5		4.0	4.8		4.0	4.8	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86		1.00	0.86		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	1503		1662	1498		1662	1690		1884	1732	
Flt Permitted	0.67	1.00		0.73	1.00		0.25	1.00		0.09	1.00	
Satd. Flow (perm)	1176	1503		1286	1498		432	1690		176	1732	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	11	2	32	149	5	116	52	832	177	80	778	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	11	34	0	149	121	0	52	1009	0	80	779	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.1	12.1		11.6	11.6		49.8	46.6		52.0	47.7	
Effective Green, g (s)	12.1	12.1		11.6	11.6		49.8	46.6		52.0	47.7	
Actuated g/C Ratio	0.16	0.16		0.15	0.15		0.66	0.61		0.69	0.63	
Clearance Time (s)	4.0	4.0		4.5	4.5		4.0	4.8		4.0	4.8	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0		2.5	4.0	
Lane Grp Cap (vph)	187	239		196	229		335	1038		217	1089	
v/s Ratio Prot		0.02			0.08		0.01	c0.60		c0.02	0.45	
v/s Ratio Perm	0.01			c0.12			0.10			0.23		
v/c Ratio	0.06	0.14		0.76	0.53		0.16	0.97		0.37	0.72	
Uniform Delay, d1	27.0	27.4		30.8	29.6		6.3	14.0		12.5	9.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.2		15.2	1.7		0.2	21.4		0.8	2.4	
Delay (s)	27.1	27.6		46.0	31.3		6.5	35.4		13.3	11.9	
Level of Service	C	C		D	C		A	D		B	B	
Approach Delay (s)		27.5			39.4			34.0			12.0	
Approach LOS		C			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	75.8	Sum of lost time (s)	13.3
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	2	30	142	5	110	49	790	168	76	739	1
Future Volume (veh/h)	10	2	30	142	5	110	49	790	168	76	739	1
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1750	1750	1750	1750	1750	1750	1750	1736	1750	1820	1733	1750
Adj Flow Rate, veh/h	11	2	32	149	5	116	52	832	177	80	778	1
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	1	1	0	1	1
Cap, veh/h	228	15	243	313	11	247	362	832	177	177	1051	1
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.04	0.60	0.60	0.04	0.61	0.61
Sat Flow, veh/h	1291	88	1412	1396	62	1435	1667	1388	295	1733	1730	2
Grp Volume(v), veh/h	11	0	34	149	0	121	52	0	1009	80	0	779
Grp Sat Flow(s),veh/h/ln	1291	0	1501	1396	0	1497	1667	0	1684	1733	0	1732
Q Serve(g_s), s	0.6	0.0	1.4	7.3	0.0	5.3	0.8	0.0	43.2	1.2	0.0	23.1
Cycle Q Clear(g_c), s	5.8	0.0	1.4	8.7	0.0	5.3	0.8	0.0	43.2	1.2	0.0	23.1
Prop In Lane	1.00		0.94	1.00		0.96	1.00		0.18	1.00		0.00
Lane Grp Cap(c), veh/h	228	0	258	313	0	257	362	0	1009	177	0	1053
V/C Ratio(X)	0.05	0.00	0.13	0.48	0.00	0.47	0.14	0.00	1.00	0.45	0.00	0.74
Avail Cap(c_a), veh/h	516	0	593	616	0	581	429	0	1009	232	0	1053
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	29.5	0.0	25.3	29.0	0.0	26.9	8.7	0.0	14.4	17.7	0.0	10.1
Incr Delay (d2), s/veh	0.1	0.0	0.2	0.8	0.0	1.0	0.1	0.0	28.3	1.3	0.0	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.6	2.9	0.0	2.2	0.4	0.0	27.6	1.0	0.0	11.7
LnGrp Delay(d),s/veh	29.6	0.0	25.5	29.8	0.0	27.9	8.9	0.0	42.8	19.1	0.0	13.1
LnGrp LOS	C		C	C		C	A		D	B		B
Approach Vol, veh/h		45			270			1061			859	
Approach Delay, s/veh		26.5			28.9			41.1			13.7	
Approach LOS		C			C			D			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.2	48.0		16.9	6.6	48.6		16.9
Change Period (Y+Rc), s	4.0	4.8		* 4.5	4.0	4.8		4.5
Max Green Setting (Gmax), s	5.5	43.2		* 29	5.5	43.2		28.0
Max Q Clear Time (g_c+I1), s	3.2	45.2		7.8	2.8	25.1		10.7
Green Ext Time (p_c), s	0.0	0.0		1.8	0.0	17.8		1.7

Intersection Summary	
HCM 2010 Ctrl Delay	28.8
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1: Highway 101 & North Access

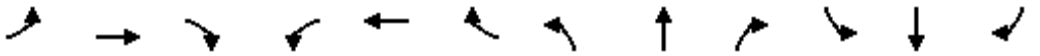
Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	87	35
Average Queue (ft)	33	20
95th Queue (ft)	67	46
Link Distance (ft)	323	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		25
Storage Blk Time (%)		5
Queuing Penalty (veh)		42

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	46	58	181	105	125	403	174	365
Average Queue (ft)	13	18	84	53	34	207	46	173
95th Queue (ft)	37	48	142	103	83	362	110	317
Link Distance (ft)		226		641		394		841
Upstream Blk Time (%)						0		
Queuing Penalty (veh)						4		
Storage Bay Dist (ft)	100		250		75		100	
Storage Blk Time (%)					0	22	0	14
Queuing Penalty (veh)					0	11	1	11

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	R
Maximum Queue (ft)	100	236	124	167	45
Average Queue (ft)	97	229	37	9	3
95th Queue (ft)	104	246	76	64	22
Link Distance (ft)		217		552	
Upstream Blk Time (%)		99			
Queuing Penalty (veh)		0			
Storage Bay Dist (ft)	50		25		75
Storage Blk Time (%)	100	1	11	1	
Queuing Penalty (veh)	85	1	92	1	

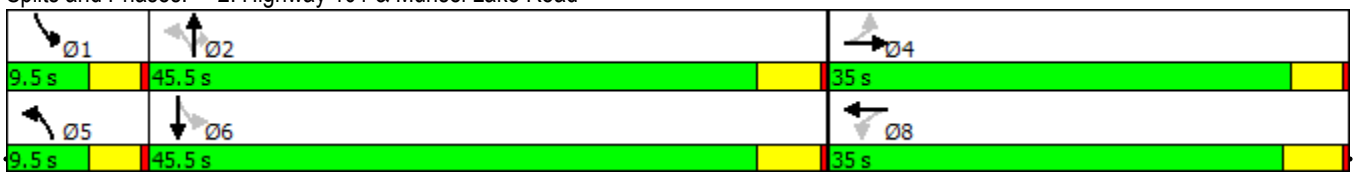


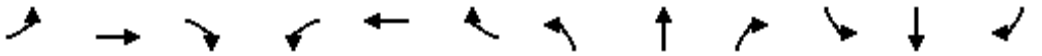
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	2	30	142	5	110	49	790	168	76	739	1
Future Volume (vph)	10	2	30	142	5	110	49	790	168	76	739	1
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	16	12	12
Storage Length (ft)	100		0	250		50	75		150	100		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	75			100			50			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.859			0.856				0.850			
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1662	1503	0	1662	1498	0	1662	1733	1488	1884	1733	0
Flt Permitted	0.679			0.735			0.242			0.188		
Satd. Flow (perm)	1188	1503	0	1286	1498	0	424	1733	1488	373	1733	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			40			40	
Link Distance (ft)		271			680			460			890	
Travel Time (s)		7.4			13.2			7.8			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	2	32	149	5	116	52	832	177	80	778	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	34	0	149	121	0	52	832	177	80	779	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		12			12			12			12	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.95	1.11	1.11
Turning Speed (mph)	15		15	15		15	15		15	15		15
Number of Detectors	2	2		2	2		2	2	1	2	2	
Detector Template												
Leading Detector (ft)	78	78		78	223		78	323	106	78	323	
Trailing Detector (ft)	2	2		2	107		2	157	100	2	157	
Detector 1 Position(ft)	2	2		2	107		2	157	100	2	157	
Detector 1 Size(ft)	20	20		20	6		20	6	6	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)	72	72		72	217		72	317		72	317	
Detector 2 Size(ft)	6	6		6	6		6	6		6	6	
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		8	8		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0	10.0	4.0	10.0	
Minimum Split (s)	35.0	35.0		32.5	32.5		9.5	36.8	36.8	9.5	36.8	
Total Split (s)	35.0	35.0		35.0	35.0		9.5	45.5	45.5	9.5	45.5	
Total Split (%)	38.9%	38.9%		38.9%	38.9%		10.6%	50.6%	50.6%	10.6%	50.6%	
Maximum Green (s)	31.0	31.0		30.5	30.5		5.5	40.7	40.7	5.5	40.7	
Yellow Time (s)	3.5	3.5		4.0	4.0		3.5	4.3	4.3	3.5	4.3	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.5	4.5		4.0	4.8	4.8	4.0	4.8	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0	4.0	2.5	4.0	
Minimum Gap (s)	2.0	2.0		2.0	2.0		2.0	2.7	2.7	2.0	2.7	
Time Before Reduce (s)	8.0	8.0		8.0	8.0		8.0	10.0	10.0	8.0	10.0	
Time To Reduce (s)	4.0	4.0		4.0	4.0		4.0	13.0	13.0	4.0	13.0	
Recall Mode	None	None		None	None		None	Min	Min	None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)	18.0	18.0		15.0	15.0			15.0	15.0		15.0	
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	
Act Effct Green (s)	11.8	11.8		11.3	11.3		48.3	43.2	43.2	49.2	45.2	
Actuated g/C Ratio	0.17	0.17		0.16	0.16		0.68	0.61	0.61	0.69	0.63	
v/c Ratio	0.06	0.14		0.73	0.51		0.14	0.79	0.20	0.22	0.71	
Control Delay	24.3	25.6		49.3	34.8		4.7	20.7	8.7	5.3	16.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	24.3	25.6		49.3	34.8		4.7	20.7	8.7	5.3	16.6	
LOS	C	C		D	C		A	C	A	A	B	
Approach Delay		25.3			42.8			17.9			15.5	
Approach LOS		C			D			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 71.3			
Natural Cycle: 95			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 20.1		Intersection LOS: C	
Intersection Capacity Utilization 76.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Highway 101 & Munsel Lake Road





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	2	30	142	5	110	49	790	168	76	739	1
Future Volume (vph)	10	2	30	142	5	110	49	790	168	76	739	1
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	12	12	12	12	12	12	12	12	12	16	12	12
Total Lost time (s)	4.0	4.0		4.5	4.5		4.0	4.8	4.8	4.0	4.8	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.86		1.00	0.86		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1662	1503		1662	1498		1662	1733	1488	1884	1732	
Flt Permitted	0.68	1.00		0.73	1.00		0.24	1.00	1.00	0.19	1.00	
Satd. Flow (perm)	1189	1503		1286	1498		423	1733	1488	372	1732	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	11	2	32	149	5	116	52	832	177	80	778	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	11	34	0	149	121	0	52	832	177	80	779	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	11.8	11.8		11.3	11.3		47.3	44.1	44.1	49.5	45.2	
Effective Green, g (s)	11.8	11.8		11.3	11.3		47.3	44.1	44.1	49.5	45.2	
Actuated g/C Ratio	0.16	0.16		0.15	0.15		0.65	0.60	0.60	0.68	0.62	
Clearance Time (s)	4.0	4.0		4.5	4.5		4.0	4.8	4.8	4.0	4.8	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0	4.0	2.5	4.0	
Lane Grp Cap (vph)	192	242		199	231		328	1046	898	341	1072	
v/s Ratio Prot		0.02			0.08		0.01	c0.48		c0.01	0.45	
v/s Ratio Perm	0.01			c0.12			0.10		0.12	0.14		
v/c Ratio	0.06	0.14		0.75	0.52		0.16	0.80	0.20	0.23	0.73	
Uniform Delay, d1	25.9	26.2		29.5	28.4		6.4	11.0	6.5	7.4	9.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.2		13.6	1.6		0.2	4.5	0.1	0.3	2.7	
Delay (s)	26.0	26.4		43.1	30.0		6.6	15.5	6.6	7.7	12.3	
Level of Service	C	C		D	C		A	B	A	A	B	
Approach Delay (s)		26.3			37.2			13.6			11.9	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	13.3
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	2	30	142	5	110	49	790	168	76	739	1
Future Volume (veh/h)	10	2	30	142	5	110	49	790	168	76	739	1
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1750	1750	1750	1750	1750	1750	1750	1733	1750	1820	1733	1750
Adj Flow Rate, veh/h	11	2	32	149	5	116	52	832	177	80	778	1
Adj No. of Lanes	1	1	0	1	1	0	1	1	1	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	1	0	0	1	1
Cap, veh/h	237	15	248	323	11	251	351	1015	871	304	1029	1
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.04	0.59	0.59	0.05	0.59	0.59
Sat Flow, veh/h	1291	88	1412	1396	62	1435	1667	1733	1487	1733	1730	2
Grp Volume(v), veh/h	11	0	34	149	0	121	52	832	177	80	0	779
Grp Sat Flow(s),veh/h/ln	1291	0	1501	1396	0	1497	1667	1733	1487	1733	0	1732
Q Serve(g_s), s	0.5	0.0	1.3	6.9	0.0	5.0	0.8	26.3	3.8	1.2	0.0	22.8
Cycle Q Clear(g_c), s	5.5	0.0	1.3	8.2	0.0	5.0	0.8	26.3	3.8	1.2	0.0	22.8
Prop In Lane	1.00		0.94	1.00		0.96	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	237	0	263	323	0	262	351	1015	871	304	0	1030
V/C Ratio(X)	0.05	0.00	0.13	0.46	0.00	0.46	0.15	0.82	0.20	0.26	0.00	0.76
Avail Cap(c_a), veh/h	593	0	677	698	0	664	424	1026	881	363	0	1030
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.9	0.0	23.9	27.4	0.0	25.4	8.9	11.3	6.7	10.7	0.0	10.3
Incr Delay (d2), s/veh	0.1	0.0	0.2	0.8	0.0	0.9	0.1	5.6	0.2	0.3	0.0	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.6	2.7	0.0	2.1	0.4	13.8	1.6	0.7	0.0	11.6
LnGrp Delay(d),s/veh	28.0	0.0	24.1	28.2	0.0	26.4	9.1	16.9	6.9	11.1	0.0	13.7
LnGrp LOS	C		C	C		C	A	B	A	B		B
Approach Vol, veh/h		45			270			1061			859	
Approach Delay, s/veh		25.0			27.4			14.9			13.5	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.1	45.1		16.6	6.5	45.7		16.6
Change Period (Y+Rc), s	4.0	4.8		* 4.5	4.0	4.8		4.5
Max Green Setting (Gmax), s	5.5	40.7		* 31	5.5	40.7		30.5
Max Q Clear Time (g_c+I1), s	3.2	28.3		7.5	2.8	24.8		10.2
Green Ext Time (p_c), s	0.0	12.0		1.9	0.0	15.5		1.8

Intersection Summary	
HCM 2010 Ctrl Delay	16.1
HCM 2010 LOS	B

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1: Highway 101 & North Access

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	86	61
Average Queue (ft)	34	24
95th Queue (ft)	71	51
Link Distance (ft)	323	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		25
Storage Blk Time (%)		5
Queuing Penalty (veh)		40

Intersection: 2: Highway 101 & Munsel Lake Road

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	T	R	L	TR
Maximum Queue (ft)	53	58	177	105	124	324	250	175	372
Average Queue (ft)	10	24	74	53	42	166	44	54	158
95th Queue (ft)	35	56	129	96	111	278	117	137	287
Link Distance (ft)		226		629		392			841
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	100		250		75		150	100	
Storage Blk Time (%)					0	16		0	12
Queuing Penalty (veh)					2	36		1	9

Intersection: 3: Highway 101 & Fred Meyer Dwy.

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	L	T	R
Maximum Queue (ft)	100	236	62	90	50
Average Queue (ft)	99	235	29	3	2
95th Queue (ft)	101	241	63	30	17
Link Distance (ft)		217		552	
Upstream Blk Time (%)		99			
Queuing Penalty (veh)		0			
Storage Bay Dist (ft)	50		25		75
Storage Blk Time (%)	100	1	7	0	
Queuing Penalty (veh)	85	3	63	0	

Appendix F

Correspondence

MEMORANDUM

September 18, 2020

To: Doug Baumgartner, ODOT Region 2 Development Review Coordinator

Wendy FarleyCampbell, City of Florence Planning Director

From: Michael Weishar, PE - Access Engineering LLC

RE: Methodology Memorandum Request - Three Mile Prairie Subdivision TIA, Florence, Oregon

Description of Development

Three Mile Prairie, formerly Sand Pine Ranch, is proposing to develop a single-family residential subdivision west and north of the intersection of US Highway 101 and Munsel Lake Road in Florence, Oregon (see Figure 1). The site is tax lot 200 on Map 18121500 and contains 35.26 acres zoned Single-Family Residential. The proposal is to construct 231 single-family residences. Tax lot 200 is landlocked. The Site proposes two accesses to Highway 101 through tax lots 1301 and 2100 on Map 18121420. The southern access from tax lot 1301 will be a new roadway that intersects Highway 101 directly opposite Munsel Lake Road. The northern access from tax lot 2100 is zoned Service Industrial and will intersect Highway 101 with a new roadway approximately 850 feet north of Munsel Lake Road..

The proposed development plan has six phases as shown in Figure 2.

Phase I contains 54 residential lots and two lots on the northern access to Highway 101 through tax lot 2100 scheduled to be completed August 2021.

Phase II, containing 52 lots and includes the southern access to Highway 101 opposite Munsel Lake Road to be completed January 2023.

Phase III containing 28 lots are planned to be completed in 2024.

Phase IV containing 28 lots are planned to be completed in 2025.

Phase V containing 32 lots are planned to be completed in 2026.

Phase VI containing 37 lots are planned to be completed in 2027.

Pipeline Projects:

The Cannery Station PUD is a mixed-use development planned for the southeast corner of Highway 101 and Munsel Lake Road. The site was planned to be developed in two phases; Phase 1 to be completed in 2021will contain a 74-bed Assisted Living facility, 52 Low-Rise Multi-Family units, and a 9,123 square feet Shopping Center. Phase 2 scheduled to be completed by 2028 will add 58 Low-Rise Multi-Family units, 31,946 square feet of Shopping Center, and a 5,962 square feet High-Turnover (Sit-Down) Restaurant. A Traffic Impact Analysis was completed for this development in September2018. I do not know the current status of this development.

Area Description

The north boundary of tax lot 200 is the Florence city limits. Properties to the west and south of the site are zoned Open Space. To the east of the site along both sides of Highway 101 the zoning North Commercial to the south as far ast 46th Street and to the north the zoning is Service Industrial. North of the site the zoning is Suburban Residential in Lane County.

Area Roadways:

Table 1: Existing Study Area Street Conditions

Street Segment	Jurisdiction/ Classification	Posted Speed	Street Width - Shoulders	Travel Lanes	Bike Lanes	Sidewalk	On-Street Parking
Oregon Coast Hwy. (US 101)							
North of Munsel Lake Rd.	ODOT Principal Arterial	40	54' - 6' both sides	2 w/CTL	Both Sides	None	None
Munsel Lake Rd to Fred Meyer North		40	54' - 64" - 6' both sides	3 w/CTL	Both Sides	None	None
Fred Meyer North to 46th Street		40	64'- Curb West, 6' East	3 w/CTL	Both Sides	West	None
South of 46th Street		40	64' - 6' East 8' West	3 w/CTL	Both Sides	None	None
Munsel Lake Road	Lane Co. Collector	35	22' - 2' both sides	2	None	None	None
Fred Meyer Driveway	Private Local	N/A	42' - Curbs both sides	2	None	South	None
46th Street	City Collector	25*	60' - Curbs both sides	2	Both Sides	Both Sides	None

Study Area: The initial study area:
- US 101 @ proposed North Site Access (~MP 187.58)
- US 101 @ Munsel Lake Road/proposed South Access (MP 187.76)
- US 101 @ Fred Meyer Driveway (MP 187.84)
- US 101 @ 46th Street (MP 188.01)

All existing intersections are currently STOP controlled for streets intersecting Highway 101.

Data Collection: Three-hour AM (6:30-9:30) and PM (3:30-6:30) intersection counts were taken on January 9, 2019. Since we believe traffic levels have not yet returned to pre-Covid19 levels, we propose to use those counts as the baseline traffic levels for the Phase 1 analysis for the year of opening, 2021.

Seasonal Factor: Seasonal factors will be calculated using a combination of the Coastal Destination Route and Commuter trends.

Future Year Traffic Volumes: Future traffic levels will be obtained from traffic data in the Florence Transportation System Plan.

Trip Generation: The trip generation for the proposed Three Mile Prairie subdivision will be taken from the tenth Edition of the Institute of Transportation Engineers' (ITE) Trip Generation Manual website using the land use code 210 - Single-Family Detached Housing as shown in Table 2 below. All trip calculations were based on the fitted curve equations for data filtered to include only sites within the United States.

Table 2: Trip Generation, Weekday and PM Peak Hours

Land Use (ITE Code)	Year	Total Units	Weekday		PM Peak Hour			
			Rate	Trips	Rate	Trips	In	Out
Single-Family Detached Housing (210)	2021	54 Dwelling Units	Curve	523	Curve	49	31	18
	2023	106 Dwelling Units	Curve	1026	Curve	95	60	35
	2026	231 Dwelling Units	Curve	2113	Curve	208	131	77

Trip Distribution: The distribution of new trips is assumed to display the same directional percentages as found during the existing traffic count at Munsel Lake Road.

Crashes: A 5–year crash history (2014-2018) will be provided for the highway section from Heceta Beach Road to 46th Street.

Traffic Analyses: Intersection operations and queuing analyses will be performed based on the current versions of the Analysis Procedures Manuals versions 1 & 2.

Mobility Targets: The mobility standards for ODOT highways are provided in Table 6 in the Updated 1999 Oregon Highway Plan. For US 101, a Statewide Highway Non-Freight Route, inside a UGB with non-freeway speed between 35 and 45 mph, the maximum allowed volume to capacity ratio is 0.85. For local roads, the maximum allowed volume to capacity ratio is 0.90.

Existing and Future Peak Hour Factors: The existing peak hour factor for US 101 will be calculated from the traffic count data.

Saturation Flow Rate: The saturation flow rate will be set to 1750 vehicles per hour per lane.

Access Management: Access management standards (access spacing, channelization, and sight distance) will be analyzed.

Left- & Right-Turn Lane Crtieria: A center-turn-lane exists on Highway 101 throughout the study area. Only Right-Turn lane criteria will be analyzed.

Yours very truly,

Michael Weishar, PE
Access Engineering LLC

Oregon
Kate Brown, Governor

DATE: September 22, 2020

TO: Doug Baumgartner
Region 2 Development Review Coordinator

FROM: Arielle S. Ferber, PE
Traffic Analysis Engineer

SUBJECT: Three Mile Prairie Subdivision TIA Methodology Memorandum (City of Florence, Oregon)
TIA Methodology Memorandum Review Comments

ODOT Region 2 Traffic has completed our review of the submitted traffic impact analysis methodology memorandum (dated September 18, 2020) for the proposed Three Mile Prairie Subdivision to be located northwest of the intersection of US Highway 101 at Munsel Lake Road in the City of Florence, Oregon. with respect to consistency and compliance with current versions of ODOT's Analysis Procedures Manual (APM). Both versions of the APM were most recently updated in July 2020. Current versions are consistently published online at: http://www.oregon.gov/ODOT/TD/TP/Pages/APM.aspx. As a result, we submit the following comments for consideration:

- Description of Development: Inconsistency in buildout schedule. Page 1 lists Phase VI to include 231 dwelling units (total) to be completed by year 2027 while Table 2 (Page 3) lists 231 dwelling units (total) in year 2026.
- Pipeline Projects: Inclusion of the Cannery Station PUD as a background development for all build years analyzed is recommended.
- Data Collection: Use of the turning movement counts collected in January 9, 2019 is acceptable with application of the appropriate growth rate to obtain existing traffic (year 2020) and background traffic (year 2021, 2023, and 2026).
- Seasonal Factors: Please add discussion regarding use of seasonal factors instead of nearby ATR 20-026 or characteristic table to TIA.
- Future Year Traffic Volumes: Please add discussion regarding use of Florence Transportation System Plan instead of ODOT Future Volume Table to TIA.
- Trip Generation: Although the trip generation should be calculated based on the fitted curve equation, filtering the data to include only sites located within the United States is not recommended. Please update trip generation volumes as needed.

Thank you for the opportunity to review this traffic impact analysis methodology memo. I look forward to reviewing the Three Mile Prairie Subdivision TIA. If there are any questions regarding these comments, please contact me at (503) 986-2857 or Arielle.Ferber@ODOT.state.or.us