

MEMORANDUM

DATE: November 30, 2021

TO: City of Newberg
ODOT Region 2

FROM: Dana Beckwith, PE, PTOE
Richard Martin, EIT

SUBJECT: Newberg SEC of Brutscher and East Portland Transportation Impact Analysis P20-005

This memorandum summarizes the traffic impact analysis associated with the proposed development located at tax lots 1900 and 2002 in Newberg, Oregon. The purpose of this analysis is to identify potential impacts to the transportation network for the year of opening for the site, based on the standards established by the City of Newberg and the Oregon Department of Transportation (ODOT). Based on coordination with the City of Newberg and ODOT Region 2 and the previously submitted Methodology Memorandum, this traffic impact analysis considers the following elements:

- Introduction
- Existing Conditions
 - Existing Traffic Volumes
 - Existing Intersection Operations
 - Crash Data Analysis
- Planned Improvements
- Impacts Analysis
 - Trip Generation and Trip Distribution
 - Background Growth
 - In-Process Trips
 - 2023 No-Build Volumes
 - 2023 Buildout Volumes
 - Future Intersection Performance
- Queueing Analysis
- Sight Distance Evaluation
- Results and Recommendations
- Appendix

Based on coordination with the City of Newberg and ODOT, the following intersections and site accesses were evaluated:

- Brutscher Street at Pacific Highway West (OR 99W)
- Vittoria Way at OR 99W
- Providence Drive at OR 99W
- N Springbrook Road at OR 99W
- N Springbrook Road at Haworth Avenue

ODOT recommends studying all the state highway intersections that may be anticipated to see an increase in either 50 peak hour trips and/or 300 ADT. Based on the trip generation and distribution evaluation, it was determined that trips will exceed this threshold for the intersection of Brutscher Street at OR 99W. The other study intersections were requested for analysis by the City of Newberg due to their inclusion in the Newberg Transportation System Plan (TSP) for future improvements.

INTRODUCTION

The proposed development will be located at tax lots 1900 and 2002 on Brutscher Street south of OR 99W in Newberg, Oregon. The site will include construction of a new four-story, 79-room hotel. Figure 1 shows a vicinity map that identifies the project site and the study intersections. Figure 2 shows a preliminary site plan. The site currently hosts a parking lot that serves as overflow for the building at 901 N Brutscher Street on the west side of Brutscher Street, opposite the project site. The existing parking lot on tax lot 2002 will be retained. Two additional parking lots will be added, bringing the total number of parking stalls to 80. A new site access is proposed approximately 135 feet south of the existing driveway on Brutscher Street.

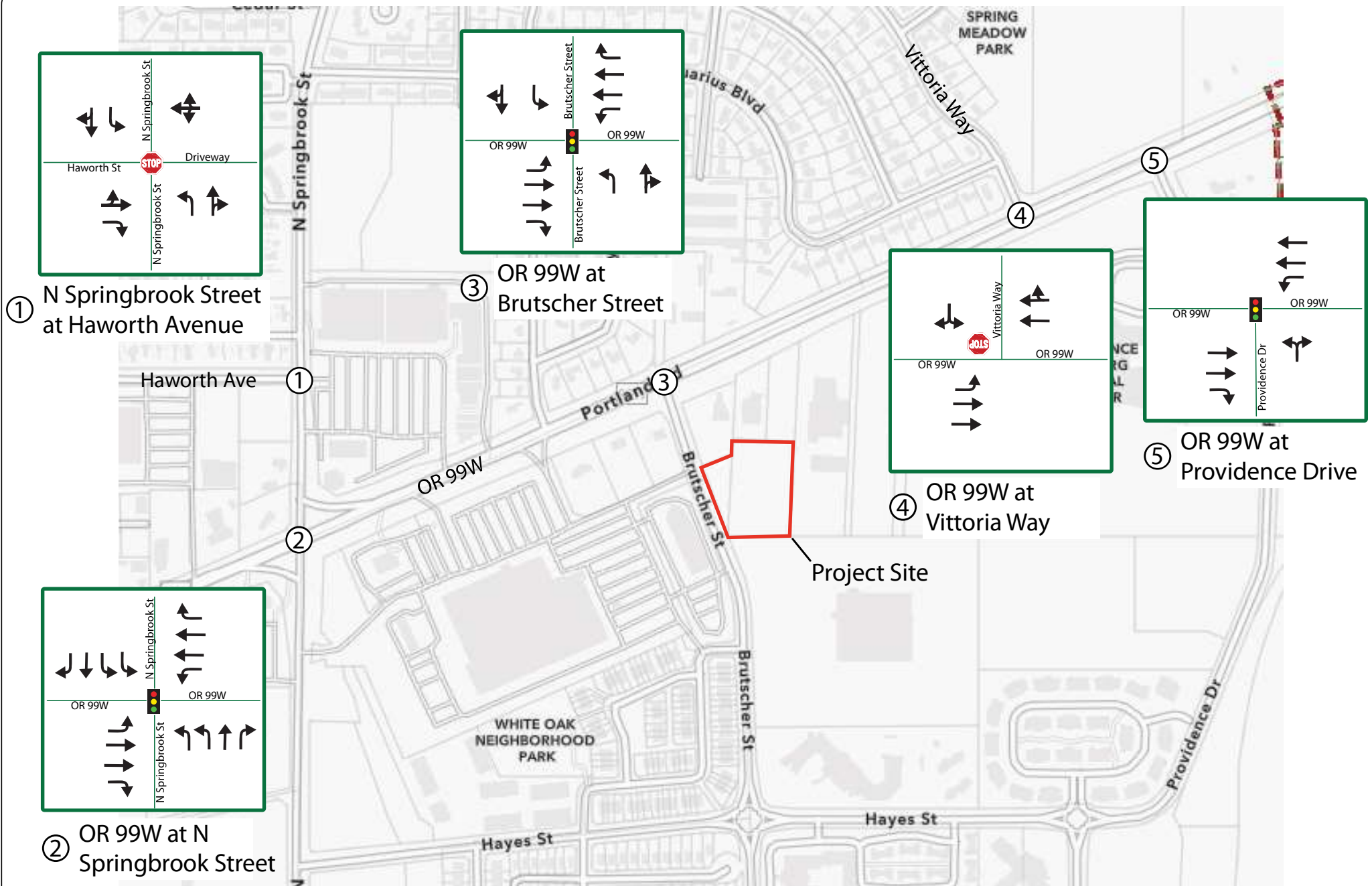
EXISTING CONDITIONS

Existing transportation conditions were evaluated at the study intersections. All modes of travel were evaluated, including pedestrians, bicycles, motor vehicles and transit. The existing transportation conditions are summarized in Table 1.

Table 1: Roadway Characteristics

Roadway	Functional Classification ¹	Posted Speed Limit	Sidewalks	Transit	Bike Lanes	Lane Geometry	On-Street Parking
OR 99W ²	Major Arterial (City) / Urban Other Principal Arterial (ODOT)	35 mph	Partial – Sidewalks do not exist on the east side of OR 99W south of SE High School Way	NW Collector Line 3, YCTA Route 7	Both Sides	Two 12' lanes in each direction and a two-way left-turn lane	None
Brutscher Street	Major Collector	25 mph	Both Sides	None	None	One 11'-12' lane in each direction	None
Providence Drive	Major Collector	25 mph	Both sides	None	Both sides	One 10'-11' lane in each direction	None
N Springbrook Road	Minor Arterial	35 mph	Both sides	YCTA Routes 44, 46s	Both sides	One 10'-11' lane in each direction and a two-way left-turn lane	None
Haworth Avenue	Major Collector	25 mph	Both sides	None	None	One 10'-11' lane in each direction	Both sides
Vittoria Way	Minor Collector	25 mph	Both sides north of Aquarius Boulevard	None	None	One 10'-11' lane in each direction	Both sides

Notes: ¹Based on Figure 14 of the City of Newberg TSP and ODOT TransGIS.
²OR 99W is classified as a Statewide Highway, is part of the National Highway System (NHS), and is a designated freight route and a truck route.



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Traffic Signal
 = Study Intersection
 Stop Sign
 = Lane Configuration

Figure 1: Vicinity Map



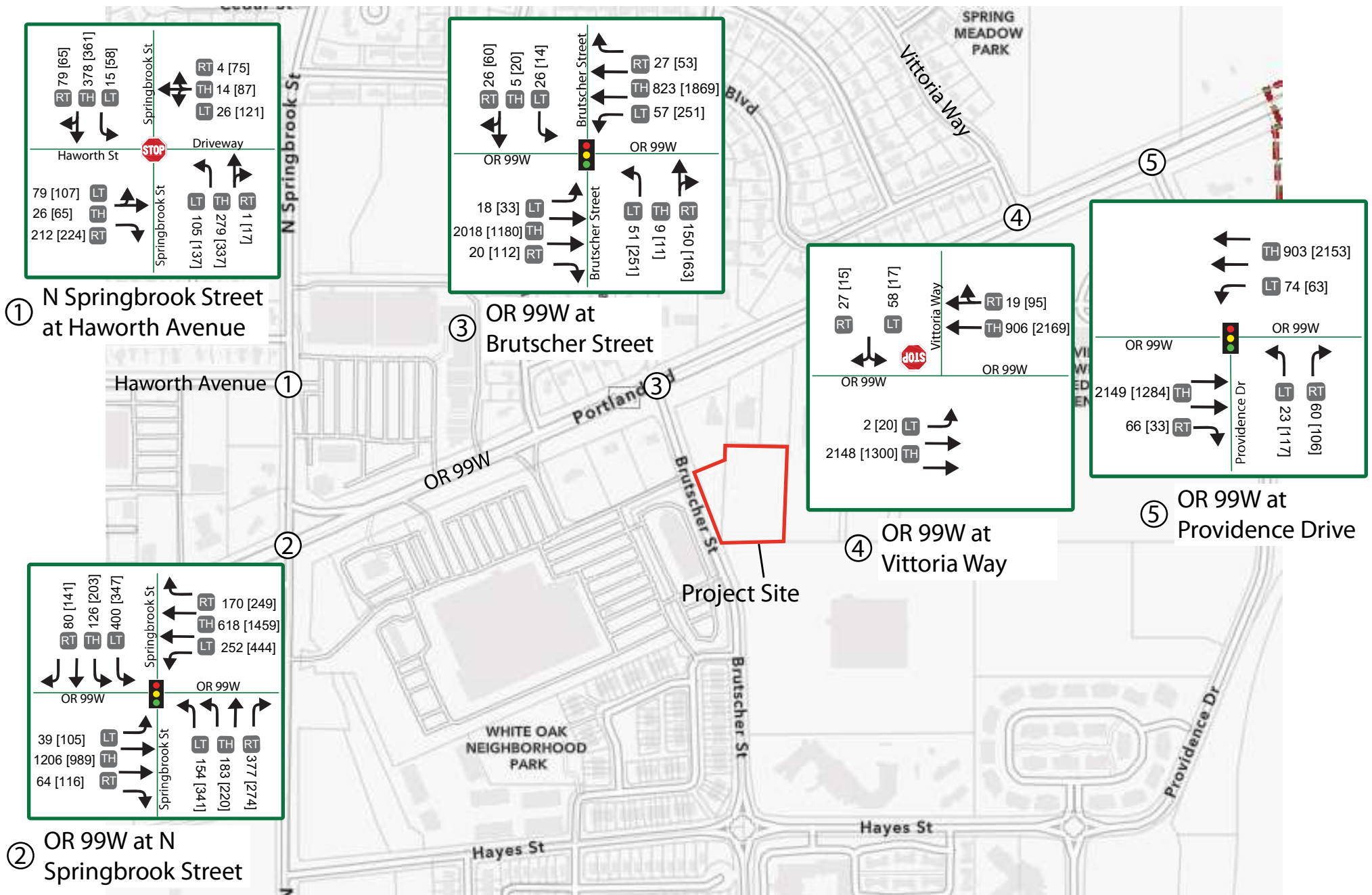
Figure 2: Preliminary Site Plan

Existing Traffic Volumes

Traffic count data was collected at the study intersections on March 5, 2020 during the AM peak period (6:00 AM to 9:00 AM) and the PM peak period (3:00 PM to 6:00 PM). The existing lane configurations are shown in Figure 1. The peak hour traffic count data has been included in Appendix A.

Based on the ODOT Analysis Procedures Manual, the collected traffic count data was adjusted to replicate the conditions when traffic volumes are typically the highest. A seasonal factor was applied to the traffic count data to develop 30th Highest Hour volumes. Figure 3 shows the 30th Highest Hour traffic volumes utilized in this analysis. This seasonal factor was determined to be 1.07744 based on an average of the following formula:

$$30HV = (\text{March PHV}) \times (\text{Peak Month Percent of ADT/Count Month Percent of ADT})$$



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Traffic Signal
 = Study Intersection
 = Left / Through / Right Turn
 Stop Sign
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 AM [PM] = Peak Hour Site Trips

Figure 3: Seasonally Adjusted 2020 Existing Volumes

August was determined to be the peak month according to records for ATR 36-004. These records are available in the ODOT Seasonal Trend Table provided in Appendix B. This approach is consistent with the City of Newberg’s TSP¹. The seasonal adjustment factor was applied to both AM and PM peak hour volumes.

Existing Intersection Operations

An intersection performance analysis was conducted to document the existing operations for the study intersections and to develop a baseline for analyzing future intersection operational needs associated with the proposed development.

The level of service and volume-to-capacity (V/C) analyses presented in this report has been completed using the Synchro (Version 10) analysis software. Synchro is based on the Highway Capacity Manual 6th Edition (HCM 6) methodology for signalized intersections. The V/C ratios are calculated according to ODOT’s Analysis Procedures Manual Version 2, Section 13.4.4. The analysis was performed for all study intersections.

The City of Newberg utilizes level of service D or better with a maximum recommended volume-to-capacity (v/c) ratio of 0.90 for signalized intersections, as stated in the 2015 Newberg Public Works Design Standards². ODOT utilizes v/c mobility targets based on the functional classification and speeds of the crossing streets at the intersection. Based on the 1999 Oregon Highway Plan, a mobility target of 0.90 was utilized for OR 99W at Providence Drive, 0.80 for OR 99W at N Springbrook Street, and 0.85 for OR 99W at Brutscher Street³. Control delay is reported as the average delay for signalized intersections and that of the worst stop-controlled approach for unsignalized intersections. Table 2 summarizes the mobility targets and the existing traffic operations for the study intersections. The detailed analysis results have been included in Appendix C. According to the performance analysis, the only intersection to meet mobility targets under existing conditions is OR 99W at Providence Drive.

Table 2: Existing Intersection Performance Summary

Intersection	Peak Hour	Mobility Targets	2020 Existing Conditions		
			Control Delay (Sec)	Level of Service	V/C
N Springbrook Street at Haworth Avenue	AM	LOS D (City)	88.3	F	1.07
	PM	v/c=0.90 (City)	93.8	F	1.07
OR 99W at N Springbrook Street	AM	LOS D (City)	61.9	E	0.81
	PM	v/c=0.80 (ODOT)	52.4	D	0.82
OR 99W at Brutscher Street	AM	LOS D (City)	11.5	B	0.80
	PM	v/c=0.85 (ODOT)	38.2	D	0.89
OR 99W at Vittoria Way	AM	LOS D (City) v/c=0.90 (City, ODOT)	36.0	E	0.44
	PM		95.8	F	0.47
OR 99W at Providence Drive	AM		12.6	B	0.82
	PM		11.0	B	0.55

Notes: **Bold** = does not meet mobility target

¹ City of Newberg Transportation System Plan Update, Volume 2, Section TM4, Page 8, September 1, 2012.

² [2015 Newberg’s Public Works Design & Construction Standards](#), Section 5.4.8 Offsite Traffic Evaluation, page 113.

³ Based on the 1999 Oregon Highway Plan, Policy 1F, Table 6.

The Newberg TSP lists the intersection of N Springbrook Road at Haworth Avenue as exceeding mobility standards under existing conditions in 2016. The TSP analysis does not account for the installation of the Dundee-Newberg Bypass, the first phase of which was completed in 2018. Based on the 2020 existing conditions analysis, the intersection continues to operate at unacceptable levels of service during both peak hours.

Crash Data Analysis

The last five years of available complete crash data (January 2015 through December 2019) was obtained from the ODOT Crash Data System and was reviewed to identify traffic safety concerns at the study intersection. The crash rates presented in Table 3 are based on the number of crashes per million entering vehicles (MEV). Typically, an intersection is not considered unsafe unless its crash rate exceeds the threshold of 1.0 crashes per MEV. The crash rate was also compared to the statewide 90th percentile crash rates for the various intersection configurations. If the crash rate is higher than the statewide 90th percentile crash rate, the intersection is flagged for further analysis and needs to be reviewed in more depth⁴. Currently, the intersections of OR 99W at Brutscher Street is on the ODOT SPIS 10% list. The OR 99W at N Springbrook Road intersection is on the ODOT SPIS 5% list.

Table 3: Crash Data Summary

Intersection	Crash History (Years)	Number of Crashes	Crashes per year	Annual Traffic Entering (veh/yr)	Crash rate per M.E.V.	Statewide 90 th Percentile Crash Rate ⁵
Haworth Avenue at N Springbrook Road	5	23	4.6	5,602,750	0.821	0.293 (3ST)
OR 99W at N Springbrook Road		37	7.4	16,552,750	0.447	0.86 (4SG)
OR 99W at Brutscher Street		28	4.4	13,607,200	0.323	0.86 (4SG)
OR 99W at Vittoria Way		3	0.6	12,245,750	0.049	0.293 (3ST)
OR 99W at Providence Drive		10	2.0	12,716,600	0.157	0.509 (3SG)
Note: 4ST = four-leg stop control, 4SG = four-leg signalized, 3ST = three-leg stop control, 3SG = three-leg signalized Bold = exceeds statewide 90th percentile crash rate.						

Based on the crash data, only the intersection of Haworth Avenue at N Springbrook Road saw a crash rate that exceeds the statewide 90th percentile crash rate. This intersection is analyzed later in the report for traffic signal warrants. Signalizing the intersection would likely affect the nature of crashes occurring at the intersection. Rear-end collisions are more typical at signalized intersections. Signalizing the intersection may help in reducing the number of turning-movement collisions.

The intersection of OR 99W at N Springbrook Road showed a high percentage of rear-end collisions, the majority of which were caused by vehicles following too closely. Rear end crashes are typical of signalized intersections, state highways, and roadways with higher speeds, which apply to OR 99W.

⁴ ODOT Analysis Procedure Manual, Section 4.2, Crash Data.

⁵ Assessment of Statewide Intersection Safety Performance, FHWA-OR-RD-18, Portland State University and Oregon State University, June 2011, Table 4.1, p. 47.

Table 4 shows the crash types by year to determine any patterns. Detailed crash data is available in Appendix D.

Table 4: Crash Types

Crash Type	Intersection					
	Haworth at N Springbrook Rd					
YEAR	2015	2016	2017	2018	2019	Subtotal
Entering at Angle		2(1)	1(0)	6(2)	3(1)	12(4)
Backing		1(0)				1(0)
Turning Movement		4(3)	4(3)	1(1)	1(0)	10(7)
Total	23(11)					
OR 99W at N Springbrook Road						
YEAR	2015	2016	2017	2018	2019	Subtotal
Entering at Angle		1(0)		2(1)		3(0)
Rear End	4(2)	3(0)	4(1)	6(6)	10(5)	27(14)
Backing	1(0)					1(0)
Turning Movement	2(0)		1(1)			3(1)
Pedestrian				1(1)	1(1)	2(2)
Sideswipe					1(0)	1(0)
Total	37(18)					
OR 99W at Brutscher Street						
YEAR	2015	2016	2017	2018	2019	Subtotal
Entering at Angle		1(1)	2(1)	3(0)	4(3)	10(5)
Fixed Object				1(1)		1(1)
Rear End	4(3)	1(1)			6(4)	11(8)
Turning Movement		1(0)		3(3)	2(0)	6(3)
Total	28(17)					
OR 99W at Vittoria Way						
YEAR	2015	2016	2017	2018	2019	Subtotal
Fixed Object				1(1)		1(1)
Turning Movement				1(1)		1(1)
Entering at Angle				1(1)		1(1)
Total	3(3)					
OR 99W at Providence Drive						
YEAR	2015	2016	2017	2018	2019	Subtotal
Rear End	4(0)	1(1)	1(0)		2(2)	8(3)
Entering at Angle					1(1)	1(1)
Turning Movement				1(1)		1(1)
Total	10(5)					

Note: X(X)= Total Crash (Injury crashes)

PLANNED IMPROVEMENTS

The Newberg TSP outlines several areas of improvements⁶. The main improvement that the document cites as resulting in safety and capacity improvements is Phase 2 of the Newberg-Dundee Bypass. Phase 1 completed construction and the Bypass was opened to the public in 2018, offering one lane in each direction. Phase 2 will offer two lanes in each direction, and is projected to finish the design acceptance phase in 2021.

⁶ City of Newberg Transportation System Plan

IMPACTS ANALYSIS

A Future Conditions Analysis was conducted to determine the expected traffic operating conditions for the study intersection for the buildout year 2023⁷. Background growth and site-generated trips were added to existing 30th Highest Hour volumes to develop the following scenarios:

- 2023 No-Build – existing 30th highest hour volumes plus background growth
- 2023 Buildout – existing 30th highest hour volumes plus background growth and site-generated trips

Trip Generation and Trip Distribution

Trip rates presented in the Institute of Transportation Engineer’s (ITE) *Trip Generation Manual, 10th Edition*, were utilized to estimate the number of vehicle trips based on the number of proposed hotel rooms. The site’s trip generation is based on ITE trip generation rates for weekdays during the peak hour of adjacent street traffic. Table 5 summarizes the estimated trip generation for the site.

As summarized in Table 5, the proposed hotel is expected to generate 37 AM peak hour trips, 47 PM peak hour trips, and 660 total daily trips. Trip distribution was based on turning movement percentages from the traffic count data collected. Trip distribution is shown in Figure 4.

Table 5: Trip Generation Summary

ITE Land Use Code	Rooms	Peak Hour Rate		AM Peak Hour			PM Peak Hour			Weekday Daily Total
		AM	PM	Total	In (59%)	Out (41%)	Total	In (51%)	Out (49%)	
310 - Hotel	79	0.47	0.60	37	22	15	47	24	23	660

Background Growth

A background growth rate was developed by comparing the 2014 and 2018 AADT records for ATR 36-004 in the ODOT Transportation Volume Tables for 2018. Based on this comparison, a growth rate of 1.3245 percent per year was determined for use in the analysis.

In-Process Trips

Per discussions with staff from the City of Newberg, no in-process developments are present within the study area. Therefore none were included in this analysis.⁸

⁷ Proposed in the Methodology Memorandum, approved by ODOT and City of Newberg.

⁸ Email from City of Newberg Engineer Kristen Svicarovich dated March 3, 2020.

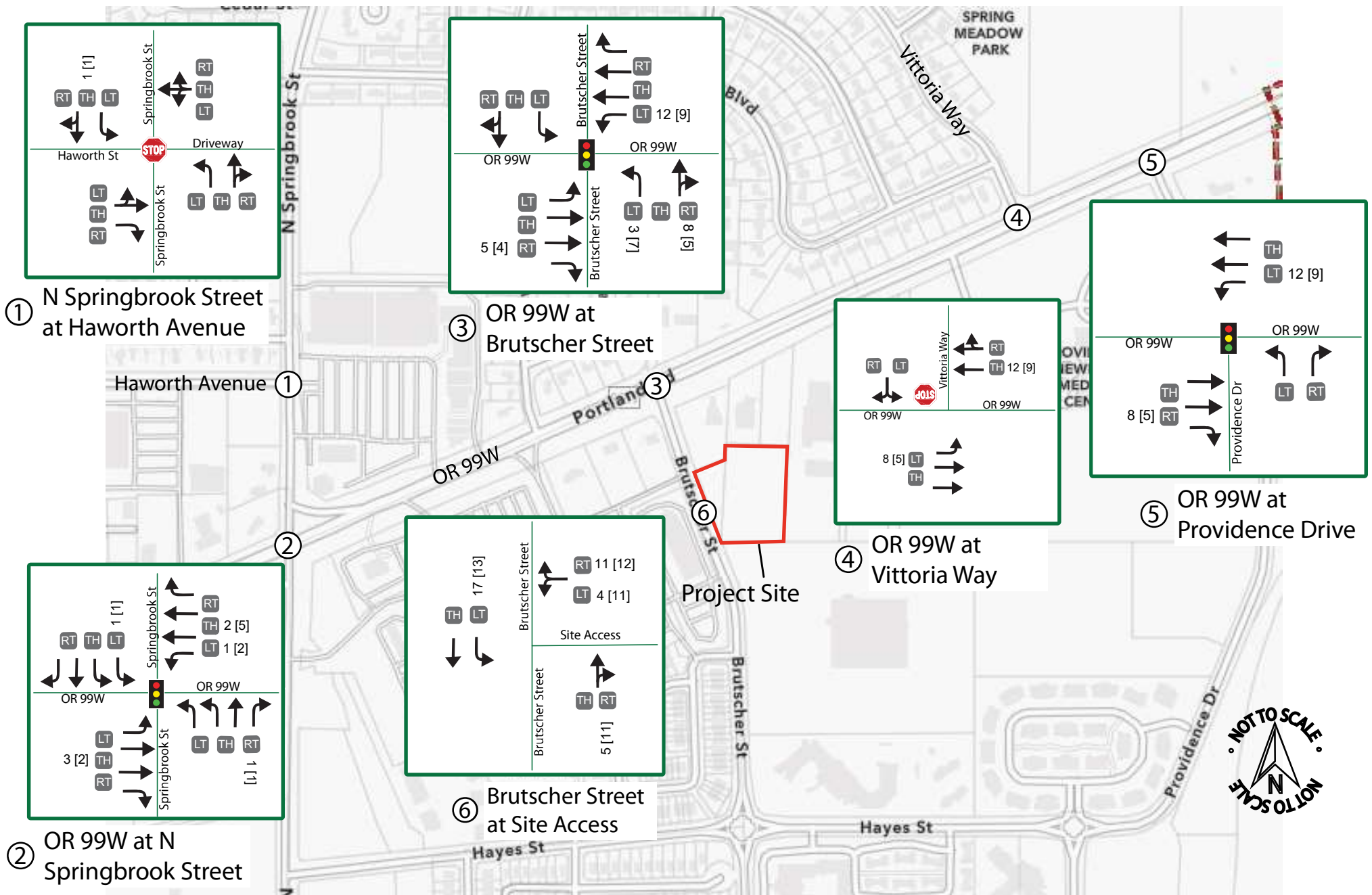


Figure 4: Trip Distribution



2023 No-Build Traffic Volumes

The background growth rates were applied to the seasonally adjusted existing volumes to develop the 2023 No-Build traffic volumes. This represents the projected traffic volumes along the transportation network without the proposed development. The 2023 No-Build traffic volumes are shown in Figure 5.

2023 Buildout Traffic Volumes

To develop the 2023 Buildout traffic volumes, project site generated trips were distributed and added to the 2023 No-Build volumes. Trips were distributed based on the existing traffic patterns in the study area. The 2023 Buildout traffic volumes are presented in Figure 6.

Future Intersection Performance

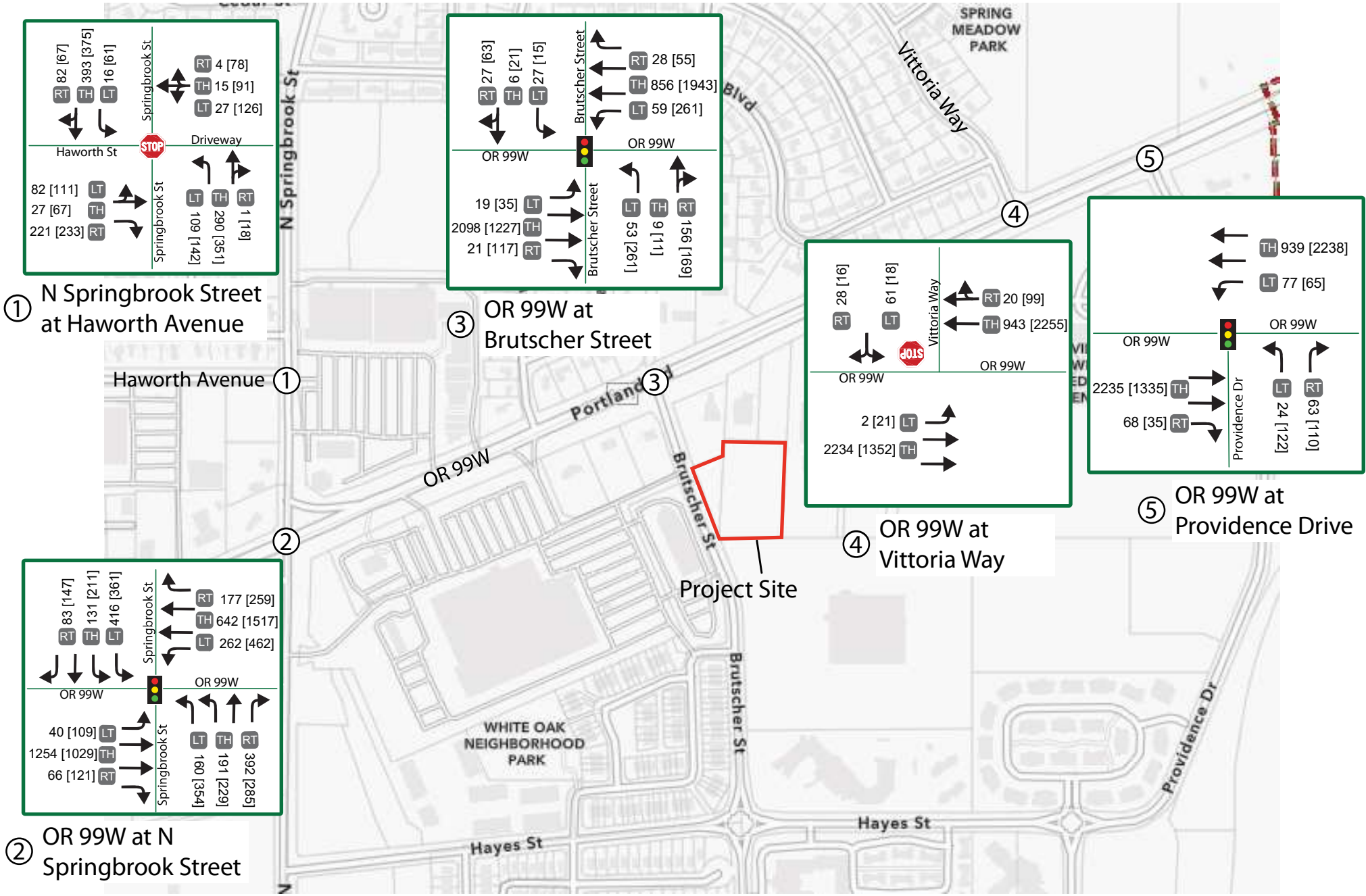
Table 6 summarizes the AM and PM peak hour analysis results for the 2023 Background and 2023 Buildout future scenarios. Intersection geometry was assumed to be the same as under the existing conditions for all study intersections. The detailed analysis results have been included in Appendix E.

Table 6: Future Intersection Performance Summary

Intersection	Peak Hour	Mobility Targets	2023 Background			2023 Buildout		
			Control Delay (Sec)	Level of Service	V/C	Control Delay (Sec)	Level of Service	V/C
N Springbrook Street at Haworth Avenue	AM	LOS D (City)	54.1	F	1.13	54.5	F	1.14
	PM	v/c=0.90 (City)	59.4	F	1.14	59.6	F	1.14
OR 99W at N Springbrook Street	AM	LOS D (City)	70.5	E	0.85	71.1	E	0.85
	PM	v/c=0.80 (ODOT)	57.4	E	0.86	57.9	E	0.86
OR 99W at Brutscher Street	AM	LOS D (City)	12.8	B	0.83	16.0	B	0.84
	PM	v/c=0.85 (ODOT)	42.4	D	0.92	47.4	D	0.93
OR 99W at Vittoria Way	AM	LOS D (City) v/c=0.90 (City)	40.7	E	0.49	41.1	E	0.49
	PM		>100	F	0.56	>100	F	0.58
OR 99W at Providence Drive	AM	v/c=0.90 (ODOT)	14.3	B	0.86	14.4	B	0.86
	PM		11.8	B	0.58	11.8	B	0.57
Brutscher Street at Site Access	AM	LOS D (City)	-	-	-	10.0	B	0.02
	PM	v/c=0.90 (City)	-	-	-	15.1	C	0.07

Notes: **Bold** = does not meet mobility target

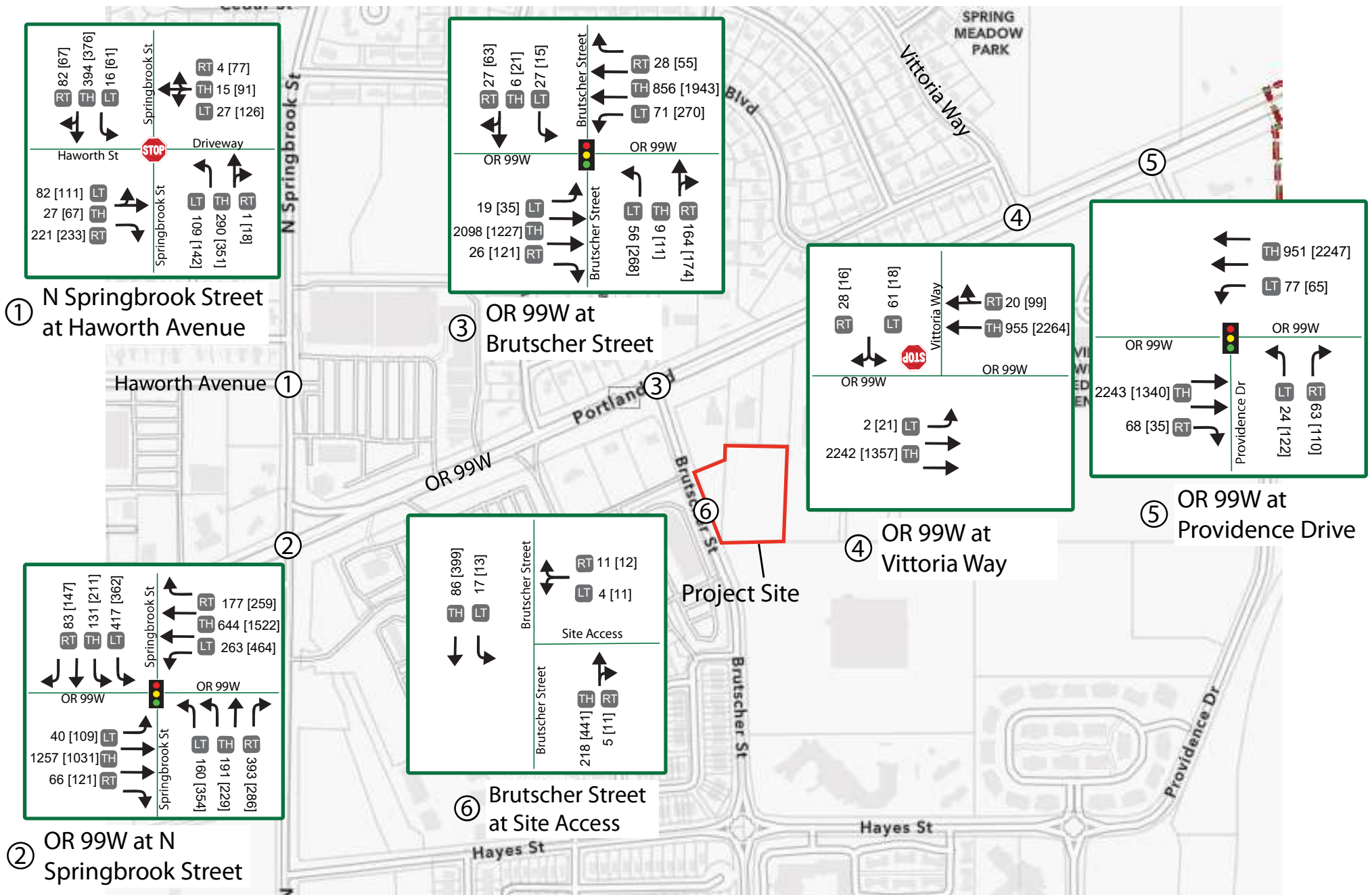
As shown in Table 6, intersections performing at acceptable levels under existing conditions were not shown to degrade to unacceptable performance levels during either the 2023 Background or 2023 Buildout conditions. The intersections that perform at acceptable levels are OR 99W at Providence Drive and Brutscher Street at the Site Access. No performance mitigations are recommended as part of this development.



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Traffic Signal
 = Study Intersection
 = Left / Through / Right Turn
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Figure 5: Traffic Volumes 2023 Background Conditions



① N Springbrook Street at Haworth Avenue

③ OR 99W at Brutscher Street

④ OR 99W at Vittoria Way

⑤ OR 99W at Providence Drive

② OR 99W at N Springbrook Street

⑥ Brutscher Street at Site Access

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**Figure 6: Traffic Volumes
2023 Buildout Conditions**

QUEUEING ANALYSIS

A peak hour queueing analysis was conducted for the study intersections to determine vehicles storage needs.

Intersection Queueing Analysis

A queueing analysis was completed for the 2023 Background and Buildout scenarios based on the Synchro 9 operations analysis and SimTraffic. Queueing was rounded up to the nearest 25-foot increment to represent a standard vehicle length. Tables 7 through 10 summarize the queueing analysis and detailed queueing reports can be found in Appendix F.

According to the queueing analysis, the average queue is accommodated for almost all turn pockets during both future conditions. There are no instances where the addition of site trips causes queueing to exceed available storage according to the analysis. Any queueing issues should therefore be considered preexisting conditions and should not be considered for mitigations tied to this development.

Table 7: N Springbrook Road at Haworth Avenue Queueing Analysis Summary

AM Peak Hour			
Movement	EB	NB	SB
Directions Served	R	L	L
Average – 2023 Background	175	50	50
Average – 2023 Buildout	200	50	50
95 th Percentile – 2023 Background	350	125	150
95 th Percentile – 2023 Buildout	400	100	150
Storage Bay Distance	-	100	100
PM Peak Hour			
Movement	EB	NB	SB
Directions Served	R	L	L
Average – 2023 Background	150	100	100
Average – 2023 Buildout	275	75	100
95 th Percentile – 2023 Background	350	250	200
95 th Percentile – 2023 Buildout	625	150	200
Storage Bay Distance	-	100	100
Notes: XX=Queue exceeds available storage/link distance			

Table 8: N Springbrook Road at OR 99W Queueing Analysis Summary

AM Peak Hour											
Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	L	L	R	L	L	R	L	L	R
Average – 2023 Background	125	150	100	125	25	50	100	250	125	150	25
Average – 2023 Buildout	125	150	125	125	0	50	100	250	125	150	25
95 th Percentile – 2023 Background	350	450	175	200	50	125	175	325	150	150	100
95 th Percentile – 2023 Buildout	350	450	200	200	0	125	175	325	150	150	75
Storage Bay Distance	350	350	450	450	325	-	-	250	115	115	115
PM Peak Hour											
Movement	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	L	L	R	L	L	R	L	L	R
Average – 2023 Background	150	100	200	350	225	150	200	200	125	150	75
Average – 2023 Buildout	125	100	200	275	175	175	200	200	125	150	75
95 th Percentile – 2023 Background	325	375	350	575	500	250	300	325	150	150	150
95 th Percentile – 2023 Buildout	300	350	300	475	450	250	300	325	150	150	150
Storage Bay Distance	350	350	450	450	325	-	-	250	115	115	115
Notes: XX=Queue exceeds available storage/link distance											

Table 9: Brutscher Street at OR 99W Queueing Analysis Summary

AM Peak Hour						
Movement	EB	EB	WB	WB	NB	SB
Directions Served	L	R	L	R	L	L
Average – 2023 Background	25	25	75	25	75	50
Average – 2023 Buildout	50	25	75	25	75	50
95 th Percent – 2023 Background	100	100	125	50	150	75
95 th Percent – 2023 Buildout	125	125	150	50	125	100
Storage Bay Distance	230	175	350	125	230	-
PM Peak Hour						
Movement	EB	EB	WB	WB	NB	SB
Directions Served	L	R	L	R	L	L
Average – 2023 Background	75	100	350	50	250	25
Average – 2023 Buildout	50	100	375	25	250	25
95 th Percent – 2023 Background	175	250	450	125	275	50
95 th Percent – 2023 Buildout	125	250	400	125	275	50
Storage Bay Distance	230	175	350	125	230	-

Notes: **XX**=Queue exceeds available storage/link distance

Table 10: OR 99W at Providence Drive Queueing Analysis Summary

AM Peak Hour				
Movement	EB	WB	NB	NB
Directions Served	R	L	L	R
Average – 2023 Background	25	75	25	75
Average – 2023 Buildout	25	75	25	75
95 th Percentile – 2023 Background	100	125	75	125
95 th Percentile – 2023 Buildout	100	125	75	125
Storage Bay Distance	100	400	175	-
PM Peak Hour				
Movement	EB	WB	NB	NB
Directions Served	R	L	L	R
Average – 2023 Background	25	150	125	100
Average – 2023 Buildout	25	200	125	100
95 th Percentile – 2023 Background	75	400	200	200
95 th Percentile – 2023 Buildout	75	500	200	200
Storage Bay Distance	100	400	175	-

Notes: **XX**=Queue exceeds available storage/link distance

TRAFFIC SIGNAL WARRANT ANALYSIS

A traffic signal warrants analysis was conducted for the only unsignalized intersection of Haworth Avenue at N Springbrook Road based on the 2009 Manual for Uniform Traffic Control Devices (MUTCD) Section 4C.04 Warrant 3, Peak Hour. N Springbrook Road is the major street and Haworth Avenue is the minor street in this analysis. Under 2020 existing conditions, N Springbrook Road showed 905 vehicles during the PM peak hour for both approaches and Haworth Avenue showed 317 for the higher volume approach. Figure 7 shows the MUTCD traffic signal warrant minimums. Under existing conditions, a traffic signal is warranted at the intersection.

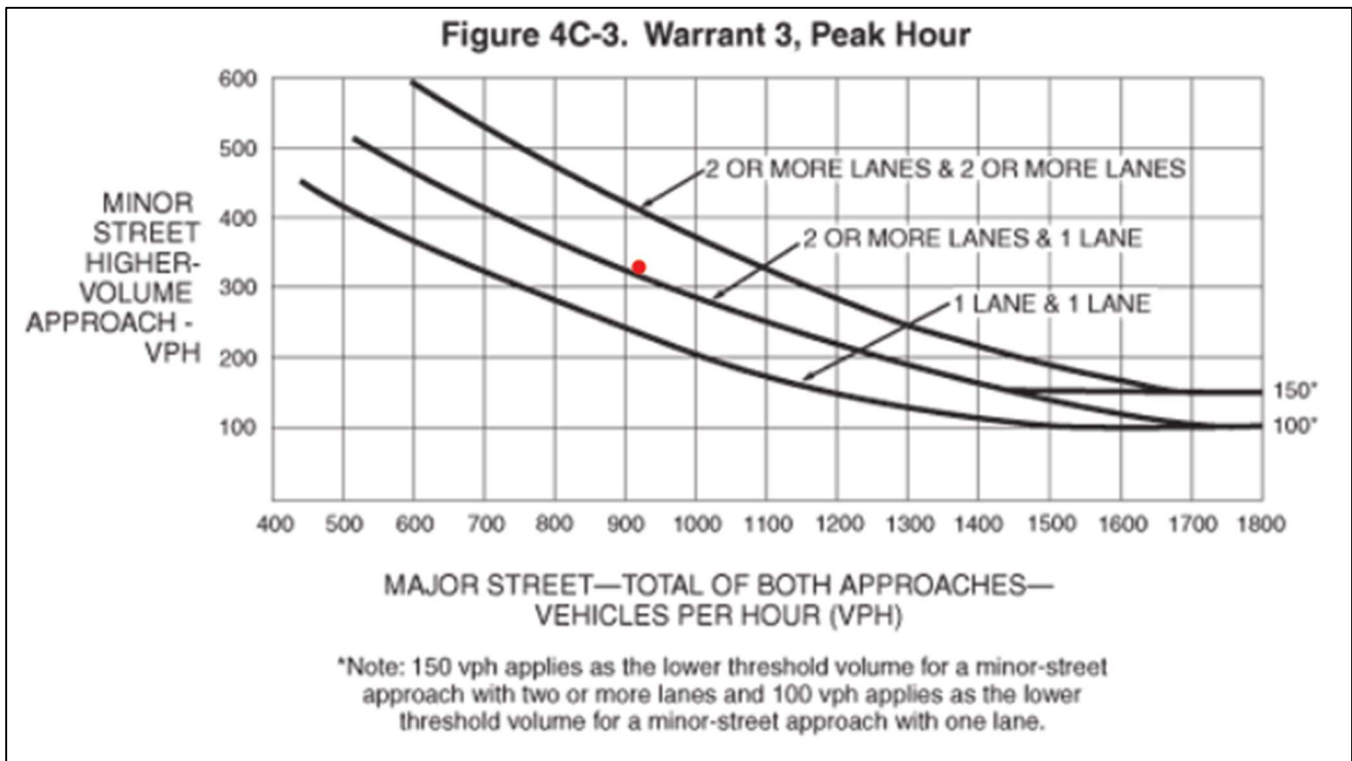


Figure 7: MUTCD Signal Warrants

SIGHT DISTANCE EVALUATION

Intersection and stopping sight distances were evaluated for the proposed site accesses along Walnut Street. The sight distance evaluation follows the guidance provided in the American Association of State Highway and Transportation Officials (AASHTO) Geometric Design of Highways and Streets, 2011. For a 25-mph roadway, AASHTO requires 155 feet of stopping sight distance and 280 feet of intersection sight distance. AASHTO also requires an assumed object height of 4.5 feet, a driver’s eye height of 3.5 feet, and a driver’s setback of 15 feet from the traveled way. Intersection sight distance was compared to the AASHTO design intersection sight distance for the following cases:

- Case B1, Left Turn from the Minor Road⁹
- Case B2, Right Turn from the Minor Road¹⁰

Table 11 shows a summary of the sight distance evaluation. Sight distance was found to be clear in both directions for over 280 feet at the proposed site access. As summarized in Table 6, intersection sight distance standards are met for all scenarios. No mitigations are recommended.

⁹ AASHTO, Case B1 – Intersections with stop control on the minor road (AASHTO, Case B1, Table 9-6).

¹⁰ AASHTO, Case B2 – Intersections with stop control on the minor road (AASHTO, Case B2, Table 9-8).

Table 11: Sight Distance Evaluation

Sight Distance Evaluated	Estimated Available Sightline (ft)	Sight Distance Standards (ft)	Meets Standard?
Proposed site access			
Case B1: Left-turn	To the north ≈ 450	280	Yes
	To the south ≈ 650	280	Yes
Case B2: Right-turn	≈ 650	240	Yes
SSD – NB on Brutscher Street	≈ 650	155	Yes
SSD – SB on Brutscher Street	≈ 450	155	Yes

RESULTS AND RECOMMENDATIONS

This memorandum summarizes the traffic impact analysis associated with the proposed development located at tax lots 1900 and 2002 in Newberg, Oregon. The purpose of this analysis is to identify potential impacts to the transportation network for the year of the opening of the site, based on the standards established by the City of Newberg and the Oregon Department of Transportation (ODOT).

A five-year crash analysis indicates no crash patterns or safety concerns at four of the five study intersections. The study intersection that saw a crash pattern and surpassed the threshold for average statewide crashes for its intersection type was Haworth Avenue at N Springbrook Road. No crash patterns were identified, but it should be noted that signaling the intersection in accordance with the traffic signal warrants analysis would likely change the nature of crashes at the intersection. The intersection of OR 99W at N Springbrook Road saw a high number of rear-end collisions along OR 99W caused by vehicles following too closely. This is typical of signalized intersections with relatively higher speed limits, which is true of OR 99W at this location. No mitigations are recommended with regards to the crash analysis.

An intersection performance analysis was conducted to document the existing and future operations for the study intersections. According to the performance analysis, the only intersection to meet mobility targets under existing conditions is OR 99W at Providence Drive. The addition of site trips does not significantly degrade performance of any study intersections. Since standards are not met under existing conditions, performance issues should be considered preexisting conditions and specific mitigations are not identified in association with this development.

A queueing analysis was also conducted for the study intersections of Haworth Avenue at N Springbrook Road, OR 99W at N Springbrook Road, OR 99W at Brutscher Street, and OR 99W at Providence Drive. According to the queueing analysis for future conditions, there are several left- and right-turn queues that exceed available turn pocket lengths at all study intersections under background conditions. The addition of site trips does not significantly impact these conditions.

A traffic signal warrants analysis was conducted for the intersection of N Springbrook Street at Haworth Avenue. Under existing conditions, a traffic signal is warranted at the intersection.

Sight distance was evaluated for the proposed roadway access onto Brutscher Street. Sight lines were found to be clear to the north for 450 feet to the intersection at OR 99W and to the south for over 650 feet. No mitigations are recommended with regards to sight distance.

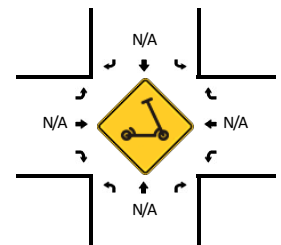
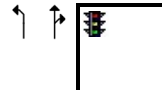
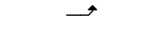
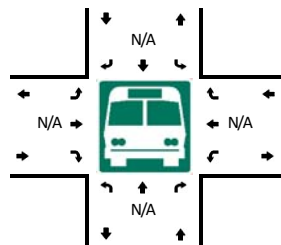
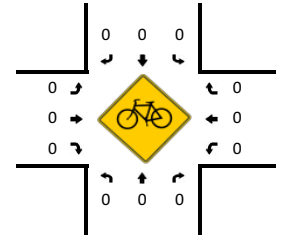
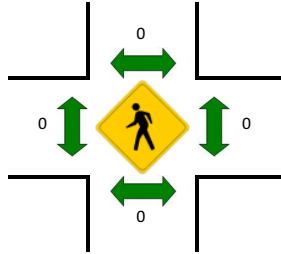
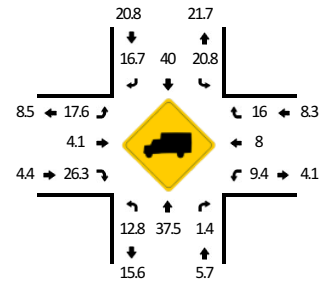
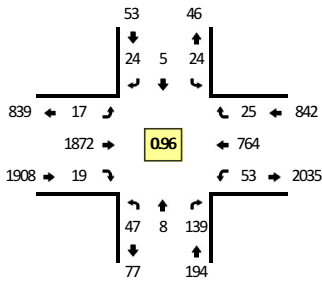
Appendix

Appendix A: Traffic Count Data

LOCATION: Brutscher St -- OR-99W
CITY/STATE: Newberg, OR

QC JOB #: 15205401
DATE: Thu, Mar 5 2020

Peak-Hour: 6:35 AM -- 7:35 AM
Peak 15-Min: 7:20 AM -- 7:35 AM



5-Min Count Period Beginning At	Brutscher St (Northbound)				Brutscher St (Southbound)				OR-99W (Eastbound)				OR-99W (Westbound)				Total	Hourly Totals	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U			
6:00 AM	1	0	2	0	2	0	0	0	1	135	6	0	0	19	3	0	0	169	
6:05 AM	3	1	10	0	3	0	0	0	0	109	1	0	0	36	0	0	0	165	
6:10 AM	0	0	3	0	1	0	0	0	1	145	1	0	0	29	0	0	0	182	
6:15 AM	2	1	4	0	1	0	1	0	2	152	2	0	0	29	2	0	0	198	
6:20 AM	1	0	5	0	0	0	2	0	0	165	2	1	3	42	0	0	0	221	
6:25 AM	3	0	12	0	1	0	0	0	2	187	0	0	4	40	0	0	0	249	
6:30 AM	2	1	5	0	1	0	0	0	3	187	2	0	4	27	3	0	0	235	
6:35 AM	1	1	10	0	4	0	3	0	0	201	0	0	2	38	1	0	0	261	
6:40 AM	0	0	18	0	2	0	1	0	0	189	0	0	6	50	0	0	0	266	
6:45 AM	1	1	13	0	0	0	0	0	1	162	1	1	2	45	1	0	0	228	
6:50 AM	4	1	10	0	2	0	1	0	1	150	3	0	3	58	3	0	0	236	
6:55 AM	0	1	3	0	1	0	3	0	3	147	2	0	4	55	2	0	0	221	2631
7:00 AM	5	2	16	0	3	1	2	0	1	151	0	1	3	67	3	0	0	255	2717
7:05 AM	1	0	10	0	0	0	1	0	4	153	2	0	4	68	3	0	0	246	2798
7:10 AM	3	1	12	0	5	1	4	0	1	148	3	1	3	74	4	0	0	260	2876
7:15 AM	3	0	10	0	4	2	1	0	1	143	3	0	6	69	3	0	0	245	2923
7:20 AM	13	1	11	0	1	0	4	0	0	131	0	0	5	81	4	0	0	251	2953
7:25 AM	8	0	13	0	0	1	1	0	1	160	2	0	4	80	1	0	0	271	2975
7:30 AM	8	0	13	0	2	0	3	0	0	137	3	1	11	79	0	0	0	257	2997
7:35 AM	4	2	9	0	0	0	0	0	2	140	3	0	7	78	0	0	0	245	2981
7:40 AM	6	1	10	0	2	1	1	0	1	136	4	0	7	77	3	0	0	249	2964
7:45 AM	0	0	4	0	0	0	1	0	0	128	9	0	7	74	4	0	0	227	2963
7:50 AM	9	0	7	0	0	1	2	0	0	96	2	0	9	91	3	0	0	220	2947
7:55 AM	6	1	4	0	0	0	4	0	3	101	5	0	7	69	5	0	0	205	2931
8:00 AM	8	0	8	0	2	3	3	0	3	100	2	0	8	89	3	0	0	229	2905
8:05 AM	9	0	6	0	3	1	2	0	3	93	4	0	8	69	4	0	0	202	2861
8:10 AM	9	0	11	0	1	1	2	0	2	118	6	0	7	60	0	0	0	217	2818
8:15 AM	10	1	9	0	4	0	4	0	2	113	5	2	4	69	2	0	0	225	2798
8:20 AM	6	2	8	0	0	1	0	0	2	115	5	1	2	62	1	0	0	205	2752
8:25 AM	5	0	3	0	3	1	3	0	1	112	7	1	11	72	2	0	0	221	2702
8:30 AM	2	1	8	0	2	2	1	0	0	102	6	1	7	72	1	0	0	205	2650
8:35 AM	6	0	4	0	1	0	2	0	5	122	3	1	6	54	0	0	0	204	2609
8:40 AM	11	0	10	0	1	0	2	0	1	102	4	0	2	55	1	0	0	189	2549
8:45 AM	10	0	9	0	0	0	0	0	4	87	7	1	7	85	5	0	0	215	2537
8:50 AM	3	1	7	0	1	0	5	0	3	109	7	0	3	64	2	0	0	205	2522
8:55 AM	10	1	5	0	2	1	4	0	1	99	7	0	8	65	2	0	0	205	2522

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	116	4	148	0	12	4	32	0	4	1712	20	4	80	960	20	0	3116
Heavy Trucks	8	0	0		4	4	12		0	108	0		8	72	8		224
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scoters																	

Comments:

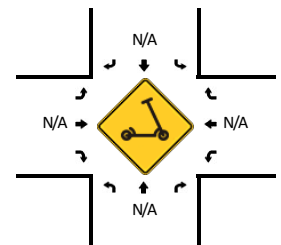
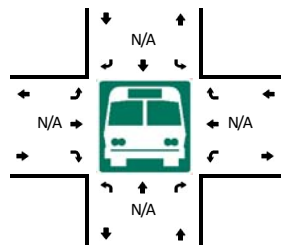
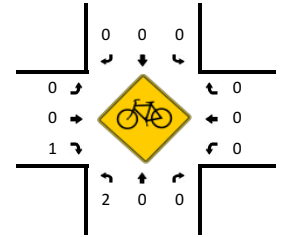
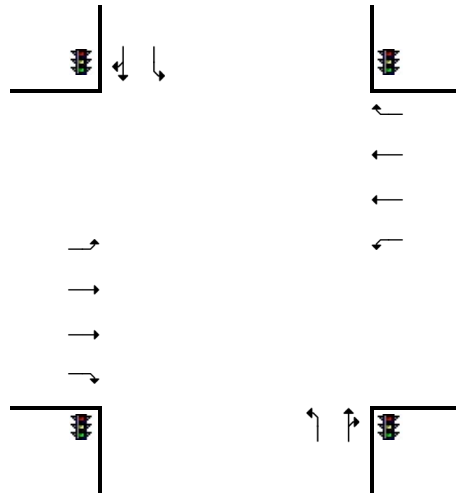
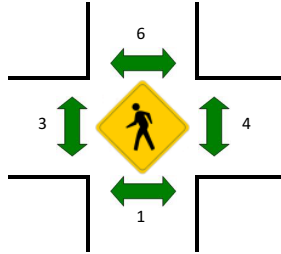
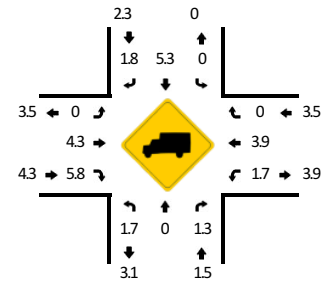
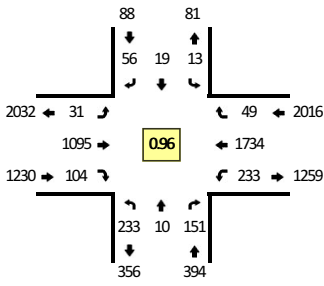
Report generated on 3/16/2020 3:10 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: Brutscher St -- OR-99W
CITY/STATE: Newberg, OR

QC JOB #: 15205402
DATE: Thu, Mar 5 2020

Peak-Hour: 4:05 PM -- 5:05 PM
Peak 15-Min: 4:50 PM -- 5:05 PM



5-Min Count Period Beginning At	Brutscher St (Northbound)				Brutscher St (Southbound)				OR-99W (Eastbound)				OR-99W (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	17	0	14	0	0	1	3	0	2	78	6	1	10	81	0	0	213	
3:05 PM	20	4	10	0	1	0	1	0	4	76	8	0	11	103	2	0	240	
3:10 PM	18	0	9	0	4	2	5	0	3	88	5	0	15	114	3	0	266	
3:15 PM	14	0	9	0	2	1	3	0	2	87	13	1	21	111	4	0	268	
3:20 PM	19	1	8	0	1	0	3	0	3	74	4	0	20	131	0	0	264	
3:25 PM	18	2	6	0	1	0	5	0	3	70	5	3	18	109	3	0	243	
3:30 PM	12	1	12	0	2	0	4	0	0	63	5	2	19	125	2	0	247	
3:35 PM	22	3	6	0	2	1	7	0	0	75	10	0	21	123	3	0	273	
3:40 PM	23	1	7	0	1	1	0	0	3	76	6	0	18	138	7	0	281	
3:45 PM	15	2	7	0	4	3	4	0	2	86	9	1	19	138	6	0	296	
3:50 PM	18	1	11	0	0	2	10	0	3	87	4	0	18	160	4	0	318	
3:55 PM	15	0	13	0	2	0	2	0	2	77	5	3	19	147	3	0	288	
4:00 PM	15	1	6	0	1	1	4	0	6	65	7	0	27	162	6	0	301	
4:05 PM	20	1	8	0	0	1	9	0	0	99	13	1	15	139	5	0	311	
4:10 PM	15	2	12	0	2	1	5	0	1	104	5	1	23	150	4	0	325	
4:15 PM	25	1	17	0	1	2	5	0	2	97	11	0	19	132	3	0	315	
4:20 PM	23	1	9	0	2	2	4	0	5	80	11	0	15	109	1	0	262	
4:25 PM	13	1	14	0	0	2	1	0	4	91	12	0	27	153	4	0	322	
4:30 PM	23	0	15	0	1	4	2	0	2	99	7	0	13	126	4	0	296	
4:35 PM	17	1	11	0	1	0	7	0	2	84	6	0	23	154	5	0	311	
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4:50 PM	25	1	20	0	2	0	6	0	0	82	7	2	25	144	7	0	321	
4:55 PM	19	0	9	0	2	2	3	0	1	89	5	4	26	153	5	0	318	
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5:05 PM	15	0	11	0	1	2	5	0	2	67	12	0	22	138	4	0	279	
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5:15 PM	17	1	10	0	0	1	7	0	1	94	9	0	22	124	5	0	291	
5:20 PM	19	0	7	0	1	2	5	0	2	82	5	1	18	135	5	0	282	
5:25 PM	20	0	6	0	1	3	4	0	0	95	5	3	17	106	5	0	265	
5:30 PM	15	2	8	0	0	1	3	0	0	95	4	1	20	155	6	0	310	
5:35 PM	27	0	5	0	0	1	5	0	2	94	2	0	17	117	1	0	271	
5:40 PM	14	0	6	0	0	1	2	0	2	76	6	1	15	147	3	0	273	
5:45 PM	8	1	14	0	2	0	4	0	3	98	3	0	21	151	5	0	310	
5:50 PM	16	3	12	0	2	2	7	0	2	77	8	0	17	110	5	0	261	
5:55 PM	26	0	13	0	2	5	1	0	1	63	6	1	20	120	3	0	261	

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	252	12	160	0	16	12	52	0	12	1088	72	24	256	1856	52	0	3864
Heavy Trucks	8	0	0		0	4	0		0	32	4		0	48	0		96
Buses																	
Pedestrians		0				8				12				0			20
Bicycles	4	0	0		0	0	0		0	0	0		0	0	0		4
Scoters																	

Comments:

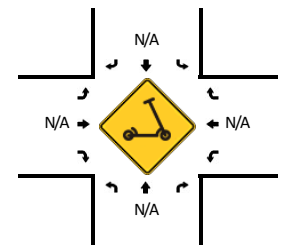
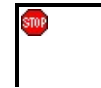
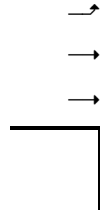
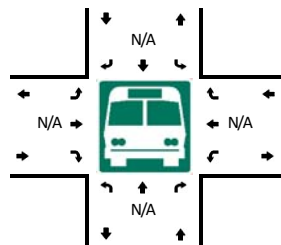
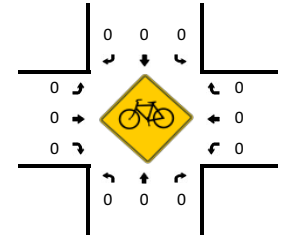
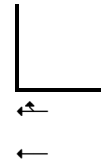
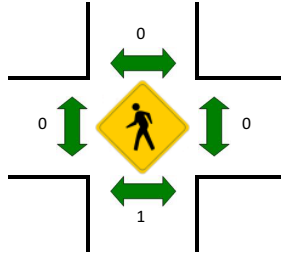
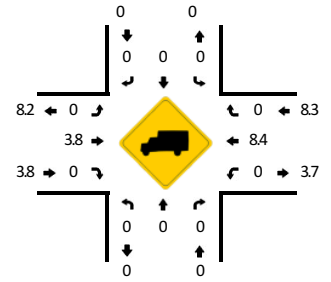
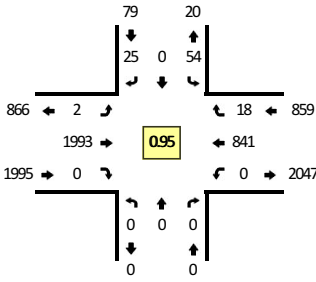
Report generated on 3/16/2020 3:10 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: Vittoria Way -- OR-99W
CITY/STATE: Newberg, OR

QC JOB #: 15205403
DATE: Thu, Mar 5 2020

Peak-Hour: 6:35 AM -- 7:35 AM
 Peak 15-Min: 6:35 AM -- 6:50 AM



5-Min Count Period Beginning At	Vittoria Way (Northbound)				Vittoria Way (Southbound)				OR-99W (Eastbound)				OR-99W (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	0	0	0	4	0	1	0	0	122	0	0	0	22	0	0	149	
6:05 AM	0	0	0	0	1	0	1	0	0	131	0	0	0	39	0	0	172	
6:10 AM	0	0	0	0	4	0	1	0	0	130	0	0	0	34	0	0	169	
6:15 AM	0	0	0	0	5	0	2	0	0	169	0	0	0	30	0	0	206	
6:20 AM	0	0	0	0	7	0	3	0	0	160	0	0	0	42	0	0	212	
6:25 AM	0	0	0	0	3	0	0	0	0	202	0	0	0	41	0	0	246	
6:30 AM	0	0	0	0	5	0	1	0	0	180	0	0	0	35	0	0	221	
6:35 AM	0	0	0	0	5	0	0	0	0	228	0	0	0	44	0	0	277	
6:40 AM	0	0	0	0	6	0	1	0	0	198	0	0	0	54	0	0	259	
6:45 AM	0	0	0	0	4	0	1	0	0	175	0	0	0	57	2	0	239	
6:50 AM	0	0	0	0	6	0	4	0	1	144	0	0	0	61	3	0	219	
6:55 AM	0	0	0	0	6	0	2	0	0	161	0	0	0	57	2	0	228	2597
7:00 AM	0	0	0	0	5	0	4	0	0	154	0	0	0	70	0	0	233	2681
7:05 AM	0	0	0	0	1	0	3	0	0	169	0	0	0	77	2	0	252	2761
7:10 AM	0	0	0	0	6	0	2	0	0	153	0	0	0	80	1	0	242	2834
7:15 AM	0	0	0	0	5	0	1	0	1	162	0	0	0	80	2	0	251	2879
7:20 AM	0	0	0	0	4	0	2	0	0	127	0	0	0	90	2	0	225	2892
7:25 AM	0	0	0	0	2	0	3	0	0	173	0	0	0	83	2	0	263	2909
7:30 AM	0	0	0	0	4	0	2	0	0	149	0	0	0	88	2	0	245	2933
7:35 AM	0	0	0	0	3	0	0	0	0	148	0	0	0	91	2	0	244	2900
7:40 AM	0	0	0	0	7	0	3	0	0	128	0	0	0	78	1	0	217	2858
7:45 AM	0	0	0	0	3	0	1	0	0	135	0	0	0	87	3	0	229	2848
7:50 AM	0	0	0	0	1	0	2	0	0	95	0	0	0	106	1	0	205	2834
7:55 AM	0	0	0	0	4	0	3	0	0	99	0	0	0	91	2	0	199	2805
8:00 AM	0	0	0	0	1	0	1	0	2	108	0	0	0	94	2	0	208	2780
8:05 AM	0	0	0	0	1	0	3	0	0	89	0	1	0	66	1	0	161	2689
8:10 AM	0	0	0	0	2	0	1	0	0	130	0	0	0	69	0	0	202	2649
8:15 AM	0	0	0	0	3	0	2	0	0	110	0	0	0	70	1	0	186	2584
8:20 AM	0	0	0	0	2	0	0	0	0	131	0	0	0	79	1	0	213	2572
8:25 AM	0	0	0	0	4	0	3	0	0	106	0	0	0	74	1	0	188	2497
8:30 AM	0	0	0	0	3	0	1	0	1	119	0	0	0	82	1	0	207	2459
8:35 AM	0	0	0	0	1	0	1	0	0	112	0	0	0	53	0	0	167	2382
8:40 AM	0	0	0	0	4	0	0	0	0	119	0	0	0	69	1	0	193	2358
8:45 AM	0	0	0	0	2	0	1	0	0	88	0	0	0	88	0	0	179	2308
8:50 AM	0	0	0	0	2	0	2	0	1	110	0	0	0	87	0	0	202	2305
8:55 AM	0	0	0	0	3	0	0	0	1	87	0	0	0	58	0	0	149	2255

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	60	0	8	0	0	2404	0	0	0	620	8	0	3100
Heavy Trucks	0	0	0		0	0	0		0	116	0		0	60	0	176	
Buses																	
Pedestrians		0				0				0				0		0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0	0	
Scoters																	

Comments:

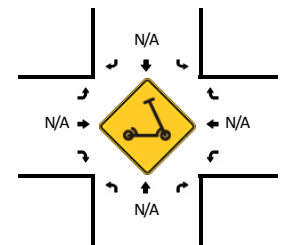
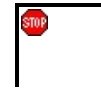
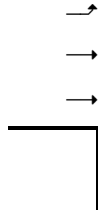
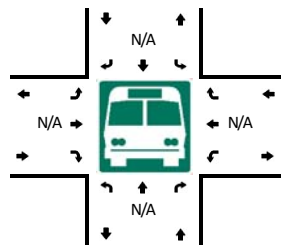
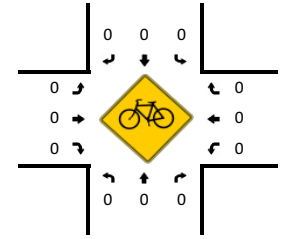
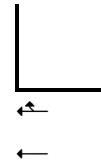
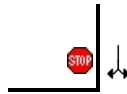
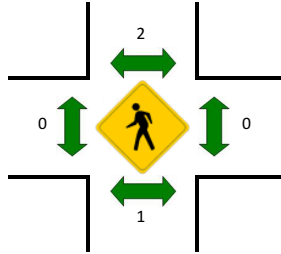
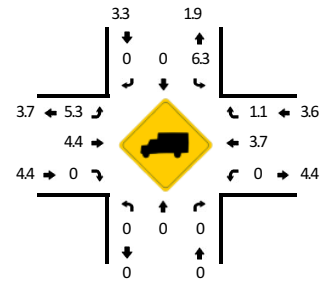
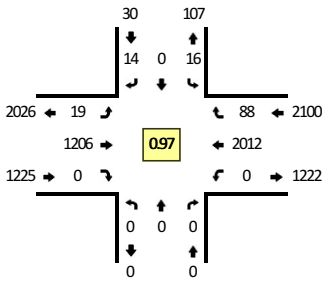
Report generated on 3/16/2020 3:10 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: Vittoria Way -- OR-99W
CITY/STATE: Newberg, OR

QC JOB #: 15205404
DATE: Thu, Mar 5 2020

Peak-Hour: 4:05 PM -- 5:05 PM
Peak 15-Min: 4:30 PM -- 4:45 PM



5-Min Count Period Beginning At	Vittoria Way (Northbound)				Vittoria Way (Southbound)				OR-99W (Eastbound)				OR-99W (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	0	0	0	0	1	0	2	0	2	87	0	0	0	92	5	0	189	
3:05 PM	0	0	0	0	5	0	1	0	1	79	0	0	0	123	4	0	213	
3:10 PM	0	0	0	0	1	0	1	0	0	90	0	0	0	143	3	0	238	
3:15 PM	0	0	0	0	2	0	1	0	0	98	0	0	0	128	4	0	233	
3:20 PM	0	0	0	0	2	0	0	0	1	81	0	0	0	153	5	0	242	
3:25 PM	0	0	0	0	1	0	3	0	3	79	0	0	0	129	6	0	221	
3:30 PM	0	0	0	0	2	0	3	0	0	76	0	1	0	127	4	0	213	
3:35 PM	0	0	0	0	6	0	2	0	1	76	0	0	0	149	5	0	239	
3:40 PM	0	0	0	0	4	0	5	0	2	77	0	0	0	167	5	0	260	
3:45 PM	0	0	0	0	4	0	4	0	0	84	0	0	0	167	2	0	261	
3:50 PM	0	0	0	0	3	0	4	0	1	84	0	0	0	192	7	0	291	
3:55 PM	0	0	0	0	0	0	2	0	2	102	0	0	0	173	11	0	290	2890
4:00 PM	0	0	0	0	2	0	1	0	1	79	0	1	0	161	8	0	253	2954
4:05 PM	0	0	0	0	1	0	1	0	0	105	0	0	0	153	6	0	266	3007
4:10 PM	0	0	0	0	1	0	0	0	1	112	0	0	0	183	5	0	302	3071
4:15 PM	0	0	0	0	1	0	1	0	4	110	0	0	0	147	7	0	270	3108
4:20 PM	0	0	0	0	2	0	3	0	2	80	0	0	0	151	13	0	251	3117
4:25 PM	0	0	0	0	4	0	3	0	0	99	0	0	0	159	6	0	271	3167
4:30 PM	0	0	0	0	2	0	3	0	1	115	0	0	0	148	10	0	279	3233
4:35 PM	0	0	0	0	1	0	0	0	3	100	0	0	0	176	12	0	292	3286
4:40 PM	0	0	0	0	2	0	0	0	1	107	0	0	0	176	6	0	292	3318
4:45 PM	0	0	0	0	0	0	1	0	1	87	0	0	0	183	5	0	277	3334
4:50 PM	0	0	0	0	0	0	1	0	1	100	0	0	0	177	8	0	287	3330
4:55 PM	0	0	0	0	0	0	1	0	2	84	0	0	0	190	6	0	283	3323
5:00 PM	0	0	0	0	2	0	0	0	3	107	0	0	0	169	4	0	285	3355
5:05 PM	0	0	0	0	2	0	3	0	4	84	0	0	0	152	9	0	254	3343
5:10 PM	0	0	0	0	0	0	2	0	0	107	0	0	0	172	11	0	292	3333
5:15 PM	0	0	0	0	1	0	4	0	3	106	0	0	0	140	11	0	265	3328
5:20 PM	0	0	0	0	2	0	0	0	0	88	0	0	0	159	8	0	257	3334
5:25 PM	0	0	0	0	0	0	3	0	2	97	0	0	0	132	9	0	243	3306
5:30 PM	0	0	0	0	1	0	0	0	3	98	0	0	0	167	5	0	274	3301
5:35 PM	0	0	0	0	2	0	0	0	1	86	0	0	0	144	6	0	239	3248
5:40 PM	0	0	0	0	2	0	3	0	1	83	0	0	0	169	5	0	263	3219
5:45 PM	0	0	0	0	2	0	2	0	1	135	0	0	0	154	9	0	303	3245
5:50 PM	0	0	0	0	2	0	1	0	1	85	0	0	0	137	11	0	237	3195
5:55 PM	0	0	0	0	0	0	1	0	1	78	0	0	0	158	6	0	244	3156

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	20	0	12	0	20	1288	0	0	0	2000	112	0	3452
Heavy Trucks	0	0	0		0	0	0		0	56	0		0	60	4		120
Buses																	
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scoters																	

Comments:

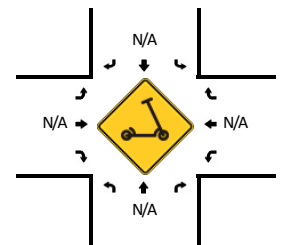
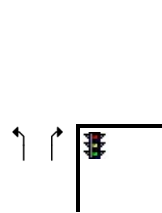
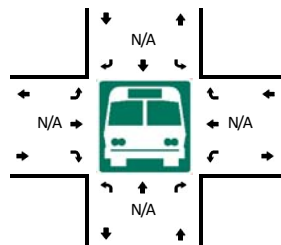
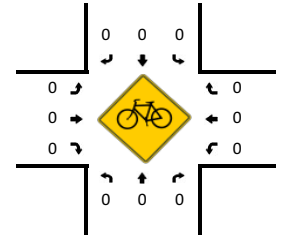
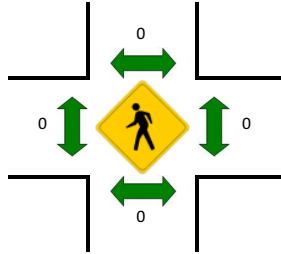
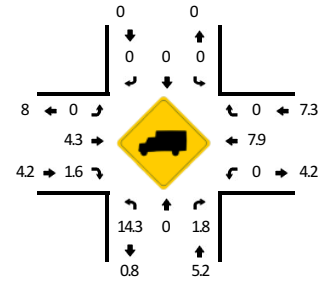
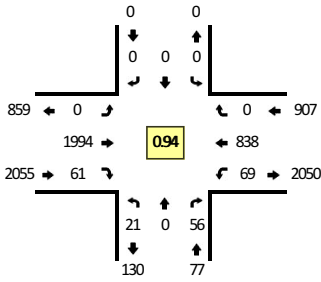
Report generated on 3/16/2020 3:10 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: Providence Dr -- OR-99W
CITY/STATE: Newberg, OR

QC JOB #: 15205405
DATE: Thu, Mar 5 2020

Peak-Hour: 6:35 AM -- 7:35 AM
 Peak 15-Min: 6:35 AM -- 6:50 AM



5-Min Count Period Beginning At	Providence Dr (Northbound)				Providence Dr (Southbound)				OR-99W (Eastbound)				OR-99W (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	0	0	0	0	0	0	0	0	117	2	0	3	22	0	0	144	
6:05 AM	0	0	0	0	0	0	0	0	0	138	2	0	1	39	0	0	180	
6:10 AM	1	0	1	0	0	0	0	0	0	126	1	0	4	34	0	0	167	
6:15 AM	0	0	3	0	0	0	0	0	0	169	3	0	0	32	0	0	207	
6:20 AM	0	0	7	0	0	0	0	0	0	162	4	0	7	43	0	0	223	
6:25 AM	0	0	1	0	0	0	0	0	0	206	4	0	4	37	0	0	252	
6:30 AM	1	0	6	0	0	0	0	0	0	181	2	0	8	35	0	0	233	
6:35 AM	2	0	4	0	0	0	0	0	0	227	7	0	4	42	0	0	286	
6:40 AM	4	0	7	0	0	0	0	0	0	197	3	0	4	50	0	0	265	
6:45 AM	3	0	6	0	0	0	0	0	0	172	9	0	12	59	0	0	261	
6:50 AM	0	0	1	0	0	0	0	0	0	142	4	0	5	61	0	0	213	
6:55 AM	0	0	2	0	0	0	0	0	0	171	5	0	7	60	0	0	245	2676
7:00 AM	1	0	6	0	0	0	0	0	0	149	4	0	12	68	0	0	240	2772
7:05 AM	2	0	5	0	0	0	0	0	0	173	5	0	2	79	0	0	266	2858
7:10 AM	0	0	3	0	0	0	0	0	0	154	3	0	6	80	0	0	246	2937
7:15 AM	1	0	5	0	0	0	0	0	0	156	6	0	4	81	0	0	253	2983
7:20 AM	2	0	5	0	0	0	0	0	0	132	5	0	4	90	0	0	238	2998
7:25 AM	3	0	3	0	0	0	0	0	0	166	4	0	4	84	0	0	264	3010
7:30 AM	3	0	9	0	0	0	0	0	0	155	6	0	5	84	0	0	262	3039
7:35 AM	1	0	7	0	0	0	0	0	0	144	4	0	7	96	0	0	259	3012
7:40 AM	4	0	11	0	0	0	0	0	0	133	6	0	5	74	0	0	233	2980
7:45 AM	1	0	3	0	0	0	0	0	0	133	8	0	7	90	0	0	242	2961
7:50 AM	5	0	3	0	0	0	0	0	0	87	8	0	7	101	0	0	211	2959
7:55 AM	2	0	2	0	0	0	0	0	0	92	5	0	10	91	0	0	202	2916
8:00 AM	5	0	7	0	0	0	0	0	0	103	6	0	10	92	0	0	223	2899
8:05 AM	5	0	7	0	0	0	0	0	0	83	7	0	4	62	0	0	168	2801
8:10 AM	4	0	6	0	0	0	0	0	0	127	8	0	5	64	0	0	214	2769
8:15 AM	6	0	2	0	0	0	0	0	0	100	7	0	2	66	0	0	183	2699
8:20 AM	3	0	4	0	0	0	0	0	0	125	9	0	13	76	0	0	230	2691
8:25 AM	3	0	5	0	0	0	0	0	0	103	6	0	9	71	0	0	197	2624
8:30 AM	8	0	2	0	0	0	0	0	0	119	6	0	2	74	0	0	211	2573
8:35 AM	5	0	3	0	0	0	0	0	0	104	6	0	6	52	0	0	176	2490
8:40 AM	3	0	2	0	0	0	0	0	0	124	4	0	3	63	0	0	199	2456
8:45 AM	4	0	5	0	0	0	0	0	0	86	3	0	2	84	0	0	184	2398
8:50 AM	5	0	4	0	0	0	0	0	0	105	8	0	8	83	0	0	213	2400
8:55 AM	7	0	10	0	0	0	0	0	0	90	4	0	7	55	0	0	173	2371

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	36	0	68	0	0	0	0	0	0	2384	76	0	80	604	0	0	3248
Heavy Trucks	4	0	0		0	0	0		0	132	0		0	52	0		188
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scoters																	

Comments:

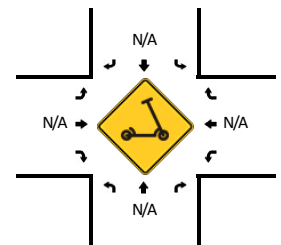
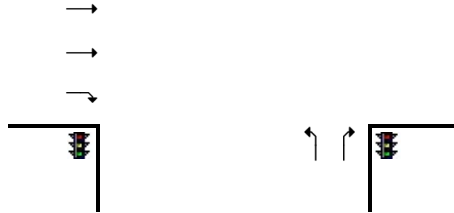
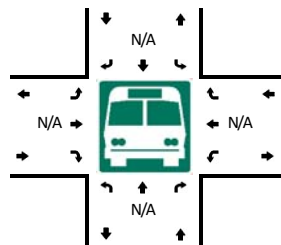
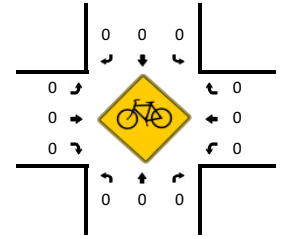
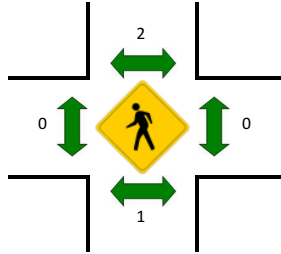
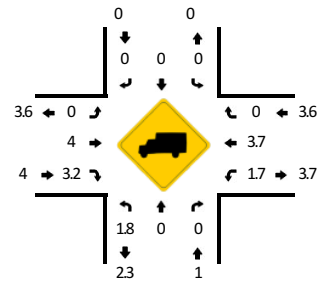
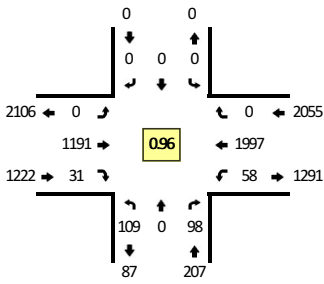
Report generated on 3/16/2020 3:10 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: Providence Dr -- OR-99W
CITY/STATE: Newberg, OR

QC JOB #: 15205406
DATE: Thu, Mar 5 2020

Peak-Hour: 4:05 PM -- 5:05 PM
Peak 15-Min: 4:40 PM -- 4:55 PM



5-Min Count Period Beginning At	Providence Dr (Northbound)				Providence Dr (Southbound)				OR-99W (Eastbound)				OR-99W (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	7	0	5	0	0	0	0	0	0	83	5	0	4	91	0	0	195	
3:05 PM	9	0	7	0	0	0	0	0	0	81	4	0	3	119	0	0	223	
3:10 PM	9	0	7	0	0	0	0	0	0	88	4	0	3	139	0	0	250	
3:15 PM	6	0	8	0	0	0	0	0	0	89	4	0	6	126	0	0	239	
3:20 PM	5	0	5	0	0	0	0	0	0	79	5	0	1	154	0	0	249	
3:25 PM	8	0	6	0	0	0	0	0	0	84	1	0	5	124	0	0	228	
3:30 PM	9	0	4	0	0	0	0	0	0	77	0	0	3	122	0	0	215	
3:35 PM	13	0	6	0	0	0	0	0	0	84	3	0	0	144	0	0	250	
3:40 PM	14	0	5	0	0	0	0	0	0	75	4	0	4	162	0	0	264	
3:45 PM	11	0	4	1	0	0	0	0	0	87	3	0	5	157	0	0	268	
3:50 PM	7	0	7	0	0	0	0	0	0	76	5	0	6	189	0	0	290	
3:55 PM	9	0	8	0	0	0	0	0	0	93	4	0	5	183	0	0	302	2973
4:00 PM	8	0	8	0	0	0	0	0	0	89	5	0	6	152	0	0	268	3046
4:05 PM	13	0	9	0	0	0	0	0	0	101	2	0	3	147	0	0	275	3098
4:10 PM	8	0	8	0	0	0	0	0	0	112	5	0	8	179	0	0	320	3168
4:15 PM	15	0	15	0	0	0	0	0	0	107	0	0	6	144	0	0	287	3216
4:20 PM	4	0	6	0	0	0	0	0	0	83	3	0	3	161	0	0	260	3227
4:25 PM	3	0	3	0	0	0	0	0	0	92	3	0	3	156	0	0	260	3259
4:30 PM	8	0	3	0	0	0	0	0	0	120	2	0	2	154	0	0	289	3333
4:35 PM	15	0	4	0	0	0	0	0	0	94	3	0	5	180	0	0	301	3384
4:40 PM	11	0	11	0	0	0	0	0	0	115	3	0	3	168	0	0	311	3431
4:45 PM	5	0	11	0	0	0	0	0	0	86	2	0	7	179	0	2	292	3455
4:50 PM	9	0	10	0	0	0	0	0	0	95	5	0	9	178	0	0	306	3471
4:55 PM	7	0	10	0	0	0	0	0	0	84	1	0	5	188	0	0	295	3464
5:00 PM	11	0	8	0	0	0	0	0	0	102	2	0	2	163	0	0	288	3484
5:05 PM	7	0	9	0	0	0	0	0	0	84	3	0	6	151	0	0	260	3469
5:10 PM	9	0	7	0	0	0	0	0	0	110	2	0	3	174	0	0	305	3454
5:15 PM	9	0	10	0	0	0	0	0	0	106	1	0	2	148	0	0	276	3443
5:20 PM	11	0	7	0	0	0	0	0	0	86	3	0	3	151	0	0	261	3444
5:25 PM	6	0	10	0	0	0	0	0	0	95	3	0	3	142	0	0	259	3443
5:30 PM	7	0	9	0	0	0	0	0	0	99	2	0	0	162	0	0	279	3433
5:35 PM	9	0	18	0	0	0	0	0	0	83	1	0	3	142	0	0	256	3388
5:40 PM	6	0	6	0	0	0	0	0	0	79	3	0	0	160	0	0	254	3331
5:45 PM	1	0	8	0	0	0	0	0	0	141	1	0	1	162	0	0	314	3353
5:50 PM	3	0	9	0	0	0	0	0	0	88	2	0	1	152	0	1	256	3303
5:55 PM	5	0	5	0	0	0	0	0	0	77	1	0	0	153	0	0	241	3249

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	100	0	128	0	0	0	0	0	0	1184	40	0	76	2100	0	8	3636
Heavy Trucks	4	0	0		0	0	0		0	44	0		0	84	0		132
Buses																	
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scoters																	

Comments:

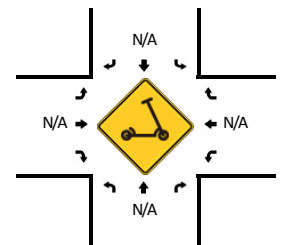
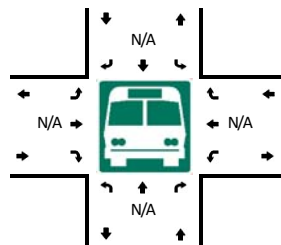
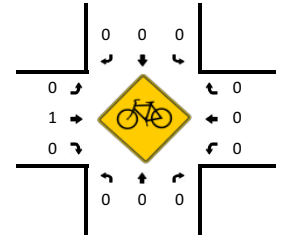
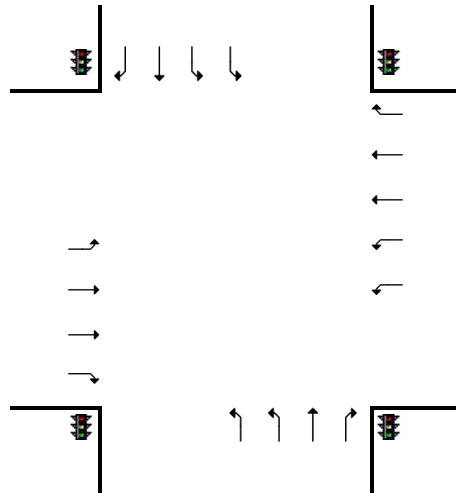
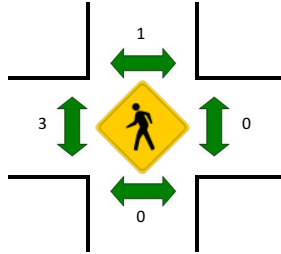
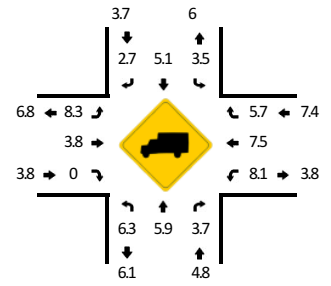
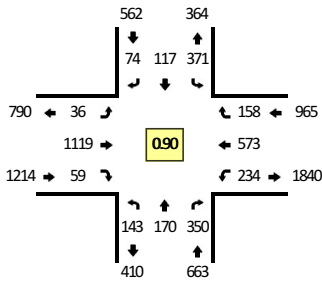
Report generated on 3/16/2020 3:10 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: N Springbrook Rd -- OR-99W
CITY/STATE: Newberg, OR

QC JOB #: 15205407
DATE: Thu, Mar 5 2020

Peak-Hour: 6:55 AM -- 7:55 AM
Peak 15-Min: 7:20 AM -- 7:35 AM



5-Min Count Period Beginning At	N Springbrook Rd (Northbound)				N Springbrook Rd (Southbound)				OR-99W (Eastbound)				OR-99W (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	1	5	24	0	18	3	1	0	1	100	1	0	3	15	4	0	176	
6:05 AM	6	2	22	0	22	7	2	0	0	73	2	0	6	25	4	0	171	
6:10 AM	2	2	26	0	18	6	0	0	0	112	0	0	3	20	4	0	193	
6:15 AM	5	2	42	0	14	5	2	0	1	102	2	0	6	18	7	0	206	
6:20 AM	4	7	26	0	32	7	1	0	0	127	1	0	10	28	8	0	251	
6:25 AM	1	4	46	0	25	11	2	0	1	114	3	0	17	22	8	0	254	
6:30 AM	6	5	39	0	46	7	3	0	1	125	5	0	9	17	2	0	265	
6:35 AM	6	8	40	0	28	11	4	0	1	125	3	0	2	28	8	0	264	
6:40 AM	8	6	26	0	35	6	6	0	3	148	2	0	13	32	6	0	291	
6:45 AM	8	15	40	0	24	7	1	0	1	89	5	0	20	22	5	0	237	
6:50 AM	8	4	27	0	33	7	2	0	0	116	4	0	15	38	11	0	265	
6:55 AM	3	16	39	0	25	9	3	0	2	90	0	0	18	30	12	0	247	2820
7:00 AM	8	15	28	0	33	6	3	0	4	118	2	0	17	40	11	0	285	2929
7:05 AM	6	14	36	0	23	5	4	0	1	83	3	0	22	38	8	0	243	3001
7:10 AM	12	16	22	0	45	2	2	0	2	116	2	0	14	37	18	0	288	3096
7:15 AM	12	9	32	0	22	12	11	0	2	85	5	0	26	48	13	0	277	3167
7:20 AM	22	15	18	0	33	13	8	0	9	107	1	0	14	52	22	0	314	3230
7:25 AM	10	20	39	0	28	13	9	0	5	88	2	0	30	50	20	0	314	3290
7:30 AM	19	19	23	0	39	15	5	0	1	100	10	0	17	55	15	0	318	3343
7:35 AM	7	9	30	0	42	23	12	0	2	81	5	0	23	54	9	0	297	3376
7:40 AM	12	9	29	0	29	7	3	0	1	110	12	0	15	58	8	0	293	3378
7:45 AM	14	13	26	0	28	10	7	0	1	68	7	0	19	57	9	0	259	3400
7:50 AM	18	15	28	0	24	2	7	0	6	73	10	0	19	54	13	0	269	3404
7:55 AM	11	17	24	0	19	16	7	0	4	60	6	0	20	55	7	0	246	3403
8:00 AM	13	12	27	0	30	6	11	0	4	59	7	0	20	64	16	0	269	3387
8:05 AM	21	12	19	0	29	3	5	0	6	81	6	0	14	49	15	0	260	3404
8:10 AM	18	16	36	0	25	15	4	0	3	77	3	0	20	40	16	0	273	3389
8:15 AM	16	7	18	0	23	6	7	0	3	98	2	0	12	54	13	0	259	3371
8:20 AM	13	18	31	0	27	18	8	0	2	76	7	0	22	39	12	0	273	3330
8:25 AM	12	7	20	0	40	8	5	0	7	88	4	1	16	47	10	0	265	3281
8:30 AM	8	10	24	0	32	16	6	0	7	68	2	0	22	50	7	0	252	3215
8:35 AM	27	5	21	0	37	12	1	0	2	95	5	0	6	45	3	0	259	3177
8:40 AM	16	7	16	0	32	4	2	0	4	72	6	0	20	45	12	0	236	3120
8:45 AM	10	10	15	0	23	8	7	0	2	103	4	0	9	70	3	0	264	3125
8:50 AM	13	14	24	0	28	13	5	0	3	71	2	0	24	48	6	0	251	3107
8:55 AM	11	13	17	1	28	10	3	0	7	87	3	1	8	53	14	0	256	3117

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	204	216	320	0	400	164	88	0	60	1180	52	0	244	628	228	0	3784
Heavy Trucks	12	4	28		24	8	4		8	48	0		20	64	8		228
Buses																	
Pedestrians		0				0				4				0			4
Bicycles	0	0	0		0	0	0		0	4	0		0	0	0		4
Scoters																	

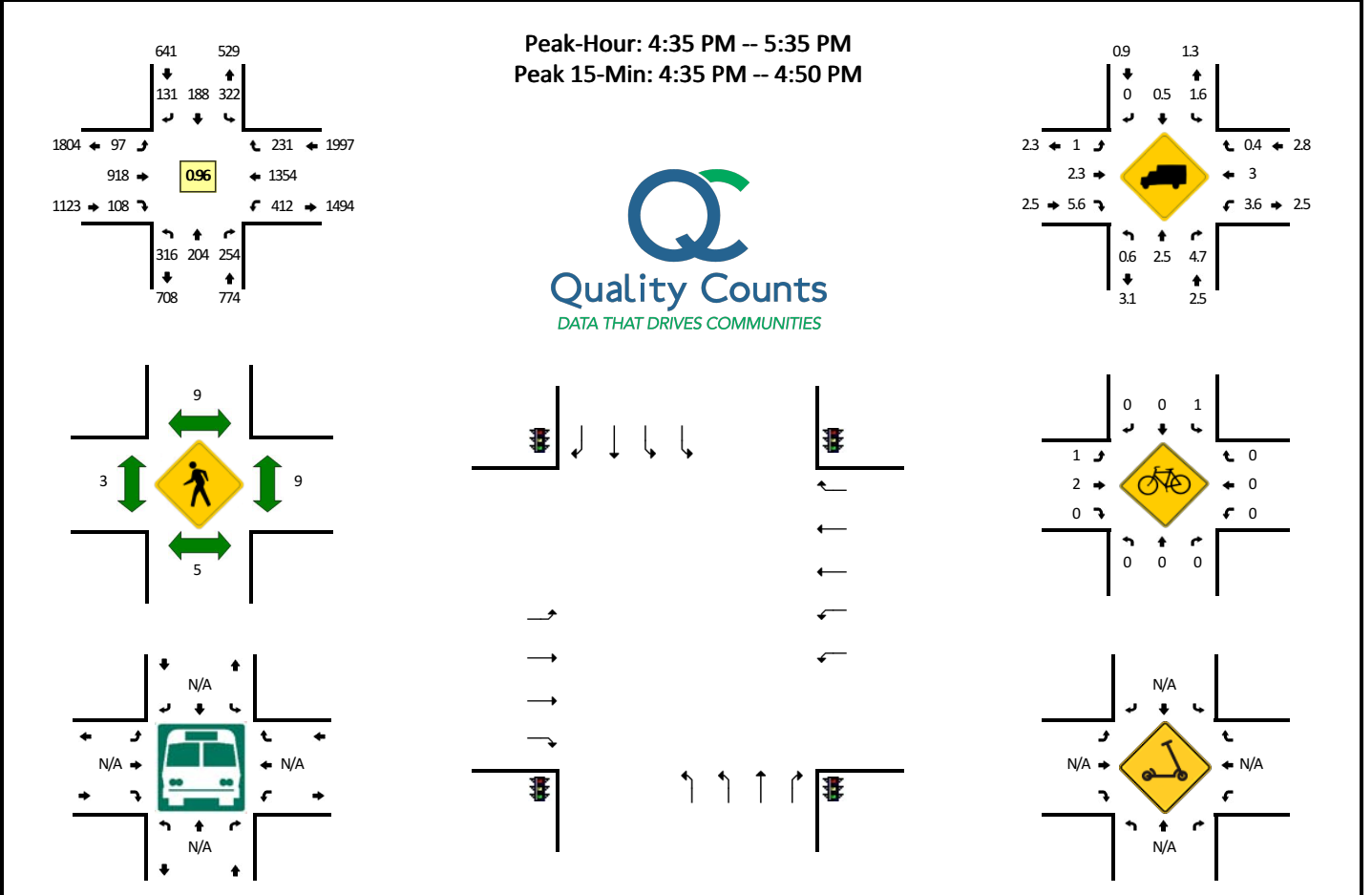
Comments:

Report generated on 3/16/2020 3:10 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: N Springbrook Rd -- OR-99W
CITY/STATE: Newberg, OR

QC JOB #: 15205408
DATE: Thu, Mar 5 2020



5-Min Count Period Beginning At	N Springbrook Rd (Northbound)				N Springbrook Rd (Southbound)				OR-99W (Eastbound)				OR-99W (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	20	16	16	0	25	18	14	0	8	76	11	0	25	70	13	0	312	
3:05 PM	24	19	18	0	25	11	11	0	9	74	12	0	26	80	17	0	326	
3:10 PM	18	12	18	0	19	9	12	0	5	65	6	0	24	94	18	0	300	
3:15 PM	13	18	26	0	32	15	7	0	10	62	10	0	30	67	15	0	305	
3:20 PM	32	13	23	0	26	19	7	0	9	66	6	0	32	92	14	0	339	
3:25 PM	18	15	13	0	22	15	5	0	12	74	11	0	28	71	19	0	303	
3:30 PM	26	14	19	0	19	16	4	0	15	76	9	0	32	101	13	0	344	
3:35 PM	24	12	12	0	27	12	5	0	7	71	5	0	31	113	15	0	334	
3:40 PM	29	10	15	0	17	14	10	0	12	85	10	0	31	114	19	0	366	
3:45 PM	23	9	17	0	30	18	3	0	6	73	12	0	41	94	16	0	342	
3:50 PM	27	21	17	0	27	26	13	0	8	61	11	0	37	111	14	0	373	
3:55 PM	38	14	13	0	38	18	7	0	9	63	8	0	41	97	14	0	360	4004
4:00 PM	22	22	12	0	18	14	8	0	10	69	6	0	43	103	21	0	348	4040
4:05 PM	30	11	28	0	38	16	9	0	10	69	9	0	45	109	15	0	389	4103
4:10 PM	15	17	21	0	27	17	10	0	7	94	10	0	37	120	21	0	396	4199
4:15 PM	23	16	25	0	31	15	12	0	6	81	10	0	40	113	19	0	391	4285
4:20 PM	32	12	23	0	24	11	13	0	5	79	11	0	32	90	18	0	350	4296
4:25 PM	20	22	17	0	34	15	9	0	5	65	4	0	25	83	25	0	324	4317
4:30 PM	34	13	22	0	28	11	10	0	11	84	6	0	33	83	15	0	350	4323
4:35 PM	30	16	24	0	23	10	18	0	12	79	8	1	39	111	16	0	387	4376
4:40 PM	27	20	18	0	27	17	8	0	9	89	6	0	33	126	22	0	402	4412
4:45 PM	18	15	24	0	34	14	6	0	8	88	6	0	41	123	17	0	394	4464
4:50 PM	22	10	21	0	24	13	8	0	5	84	11	1	27	132	29	0	387	4478
4:55 PM	26	24	23	0	20	19	12	0	9	68	7	0	31	125	15	0	379	4497
5:00 PM	26	23	21	0	24	22	11	0	10	70	5	0	30	119	18	0	379	4528
5:05 PM	41	13	16	0	40	17	14	0	11	61	13	0	45	95	13	0	379	4518
5:10 PM	27	24	23	0	27	16	8	0	8	65	10	0	32	116	23	0	379	4501
5:15 PM	26	16	23	0	31	17	11	0	6	87	15	1	37	107	22	0	399	4509
5:20 PM	29	14	14	0	24	15	14	0	10	73	12	0	34	101	16	0	356	4515
5:25 PM	18	19	26	0	22	19	8	0	4	81	5	0	31	94	16	0	343	4534
5:30 PM	26	10	21	0	26	9	13	0	2	73	10	0	32	105	24	0	351	4535
5:35 PM	28	27	21	0	24	17	13	0	8	68	7	1	28	86	21	0	349	4497
5:40 PM	23	16	24	0	21	15	11	0	10	70	8	0	27	108	23	0	356	4451
5:45 PM	22	13	22	0	32	7	8	0	13	67	6	0	47	96	19	0	352	4409
5:50 PM	25	6	19	0	18	10	7	0	5	69	5	0	16	106	29	0	315	4337
5:55 PM	23	21	17	0	18	8	9	0	9	67	11	0	30	100	7	0	320	4278

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	300	204	264	0	336	164	128	0	116	1024	80	4	452	1440	220	0	4732
Heavy Trucks	0	4	12		8	0	0		0	36	4		16	60	0		140
Buses																	
Pedestrians		8				8				0				4			20
Bicycles	0	0	0		0	0	0		0	4	0		0	0	0		4
Scoters																	

Comments:

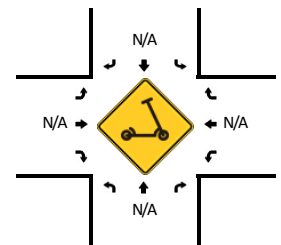
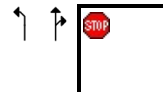
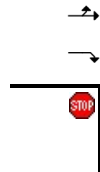
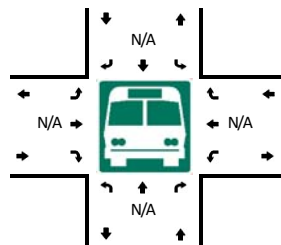
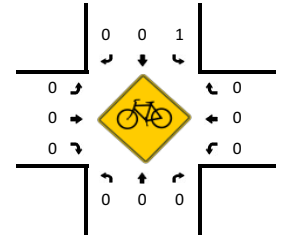
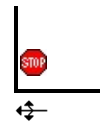
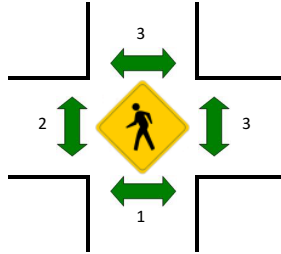
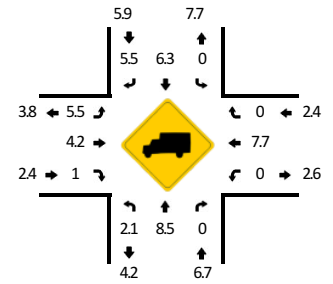
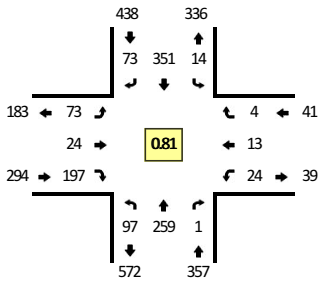
Report generated on 3/16/2020 3:10 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: N Springbrook Rd -- Haworth Ave
CITY/STATE: Newberg, OR

QC JOB #: 15205409
DATE: Thu, Mar 5 2020

Peak-Hour: 7:20 AM -- 8:20 AM
Peak 15-Min: 7:20 AM -- 7:35 AM



5-Min Count Period Beginning At	N Springbrook Rd (Northbound)				N Springbrook Rd (Southbound)				Haworth Ave (Eastbound)				Haworth Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	1	10	0	0	1	19	1	0	1	0	12	0	1	0	0	0	46	
6:05 AM	2	5	0	0	0	18	4	0	0	1	8	0	0	0	0	0	38	
6:10 AM	0	4	0	0	0	20	1	0	2	0	7	0	0	1	0	0	35	
6:15 AM	0	9	0	0	1	15	4	0	1	0	6	0	2	1	1	0	40	
6:20 AM	5	9	0	0	0	26	1	0	3	0	16	0	0	0	3	0	63	
6:25 AM	2	10	0	0	2	27	2	0	2	0	11	0	3	1	0	0	60	
6:30 AM	2	6	2	0	1	29	3	0	4	0	19	0	3	0	0	0	69	
6:35 AM	4	11	0	0	0	27	4	0	5	0	17	0	4	1	1	0	74	
6:40 AM	5	11	0	0	1	26	4	0	1	1	14	0	0	0	2	0	65	
6:45 AM	2	15	1	0	2	25	0	0	3	2	7	0	3	1	0	0	61	
6:50 AM	1	12	0	0	1	23	4	0	6	1	12	0	5	0	1	0	66	
6:55 AM	3	18	2	0	2	26	3	0	1	1	14	0	4	1	0	0	75	692
7:00 AM	5	29	0	0	2	21	7	0	4	2	9	0	5	1	1	0	86	732
7:05 AM	4	13	0	0	0	27	4	0	6	3	17	0	3	1	1	0	79	773
7:10 AM	6	32	0	0	3	24	4	0	6	2	14	0	3	1	0	0	95	833
7:15 AM	5	17	0	0	3	31	6	0	4	1	15	0	2	1	2	0	87	880
7:20 AM	4	33	0	0	2	39	3	0	6	2	18	0	1	1	1	0	110	927
7:25 AM	10	41	0	0	1	34	5	0	6	1	19	0	2	0	0	0	119	986
7:30 AM	13	24	0	0	1	36	8	0	11	1	20	0	3	1	0	0	118	1035
7:35 AM	5	15	0	0	1	42	8	0	5	7	21	0	3	1	0	0	108	1069
7:40 AM	4	10	0	0	0	26	6	0	6	1	16	0	0	2	0	0	71	1075
7:45 AM	5	12	0	0	0	27	5	0	8	1	20	0	1	2	1	0	82	1096
7:50 AM	9	19	0	0	1	17	4	0	4	3	13	0	1	1	1	0	73	1103
7:55 AM	8	22	0	0	3	35	8	0	4	4	9	0	1	0	0	0	94	1122
8:00 AM	5	22	0	0	2	27	7	0	5	4	13	0	4	1	0	0	90	1126
8:05 AM	12	22	0	0	1	14	6	0	5	0	15	0	5	1	1	0	82	1129
8:10 AM	12	23	0	0	1	24	6	0	6	0	19	0	2	2	0	0	95	1129
8:15 AM	10	16	1	0	1	30	7	0	7	0	14	0	1	1	0	0	88	1130
8:20 AM	6	22	0	0	4	31	8	0	1	2	20	0	2	0	0	0	96	1116
8:25 AM	8	13	3	0	1	28	14	0	6	4	16	0	4	0	1	0	98	1095
8:30 AM	3	17	1	0	0	31	10	0	4	3	19	0	8	1	1	0	98	1075
8:35 AM	2	9	0	0	5	28	6	0	7	1	11	0	3	1	0	0	73	1040
8:40 AM	9	12	2	0	1	20	5	0	3	2	12	0	3	4	2	0	75	1044
8:45 AM	4	6	1	0	1	27	4	0	4	2	13	0	4	1	1	0	68	1030
8:50 AM	6	11	1	0	1	28	5	0	2	8	15	0	7	1	2	0	87	1044
8:55 AM	8	19	3	0	0	22	8	0	4	2	11	0	4	2	0	0	83	1033

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	108	392	0	0	16	436	64	0	92	16	228	0	24	8	4	0	1388
Heavy Trucks	0	20	0	0	0	32	0	0	12	0	0	0	0	0	0	0	64
Buses																	
Pedestrians		0				8				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scoters																	

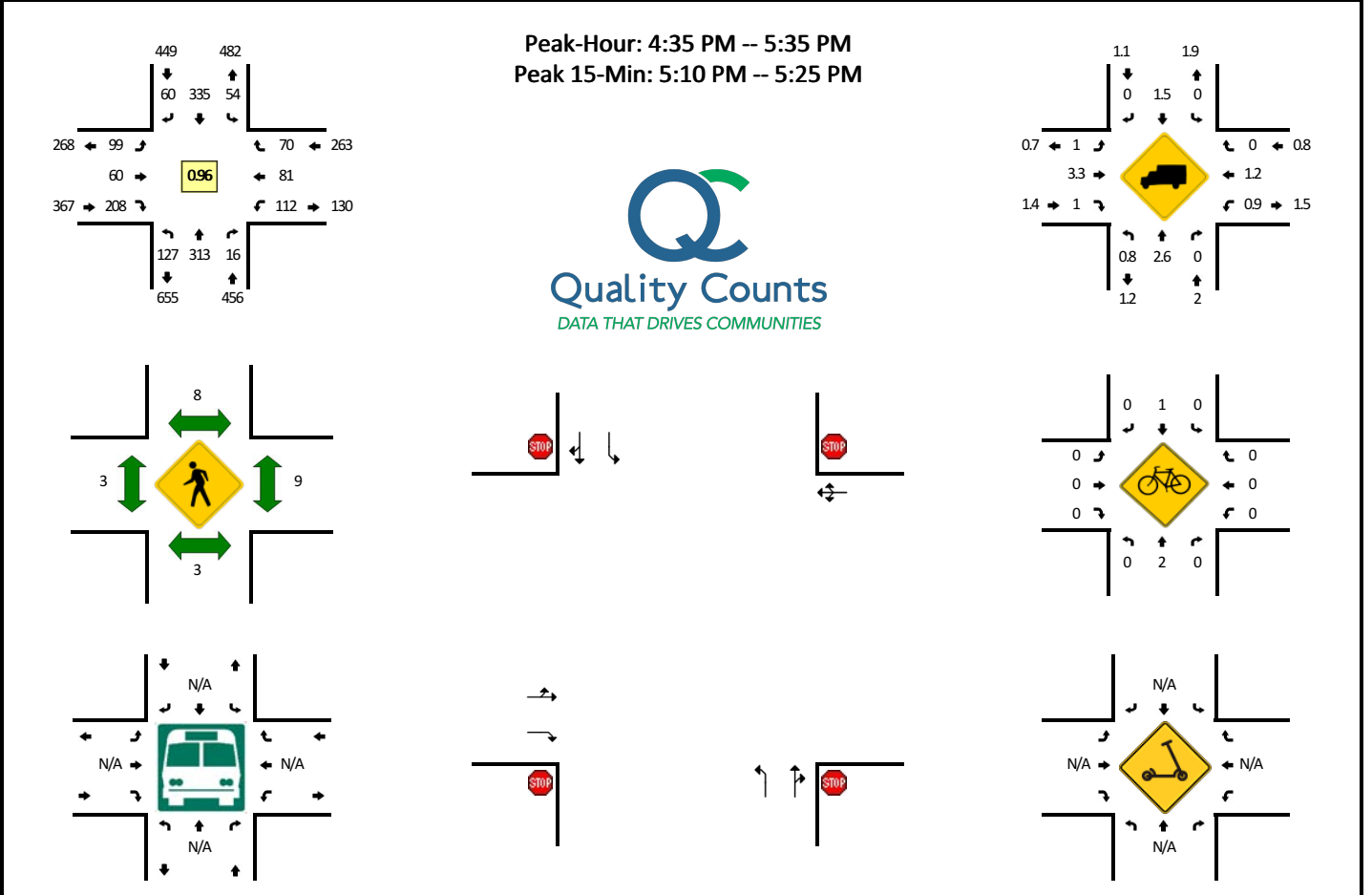
Comments:

Report generated on 3/16/2020 3:10 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: N Springbrook Rd -- Haworth Ave
CITY/STATE: Newberg, OR

QC JOB #: 15205410
DATE: Thu, Mar 5 2020



5-Min Count Period Beginning At	N Springbrook Rd (Northbound)				N Springbrook Rd (Southbound)				Haworth Ave (Eastbound)				Haworth Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:00 PM	9	20	2	0	0	32	6	0	8	8	12	0	11	3	4	0	115	
3:05 PM	10	29	2	0	1	21	2	0	6	3	16	0	8	6	3	0	107	
3:10 PM	9	20	0	0	4	24	4	0	1	4	9	0	9	5	3	0	92	
3:15 PM	11	23	1	0	4	26	3	0	4	0	21	0	8	5	6	0	112	
3:20 PM	13	19	1	0	5	20	1	0	9	10	17	0	8	3	3	0	109	
3:25 PM	12	29	1	0	2	30	6	0	6	1	17	0	7	6	2	0	119	
3:30 PM	10	22	1	0	5	15	3	0	6	3	23	0	5	8	5	0	106	
3:35 PM	12	22	2	0	4	32	7	0	8	2	13	0	5	7	4	0	118	
3:40 PM	8	24	2	0	1	22	6	0	8	9	18	0	8	7	5	0	118	
3:45 PM	11	17	0	0	4	22	8	0	4	6	22	0	5	11	4	0	114	
3:50 PM	9	23	1	0	1	40	5	0	8	4	10	0	9	2	5	0	117	
3:55 PM	10	28	1	0	9	33	2	0	7	4	16	0	4	4	4	0	122	1349
4:00 PM	11	29	1	0	3	24	3	0	6	3	16	0	7	6	6	0	115	1349
4:05 PM	9	30	1	0	7	26	8	0	5	6	20	0	12	3	4	0	131	1373
4:10 PM	12	23	0	0	3	31	3	0	5	4	19	0	13	8	6	0	127	1408
4:15 PM	11	32	1	0	3	34	2	0	4	5	13	0	7	6	9	0	127	1423
4:20 PM	10	19	0	0	3	29	4	0	4	7	12	0	11	9	6	0	114	1428
4:25 PM	11	32	1	0	5	25	5	0	5	4	17	0	6	5	5	0	121	1430
4:30 PM	12	21	3	0	2	21	3	0	10	3	9	0	13	1	4	0	102	1426
4:35 PM	7	26	3	0	5	28	8	0	7	8	20	0	11	6	7	0	136	1444
4:40 PM	8	24	3	0	6	25	5	0	7	2	25	0	4	9	4	0	122	1448
4:45 PM	9	28	1	0	3	30	6	0	10	1	22	0	7	7	5	0	129	1463
4:50 PM	12	27	0	0	0	26	5	0	12	4	11	0	12	6	5	0	120	1466
4:55 PM	14	27	0	0	3	28	6	0	13	9	18	0	6	5	7	0	136	1480
5:00 PM	13	27	2	0	8	31	4	0	6	2	14	0	8	6	2	0	123	1488
5:05 PM	10	26	2	0	4	29	3	0	9	7	20	0	11	6	4	0	131	1488
5:10 PM	16	25	4	0	5	29	4	0	3	5	19	0	10	5	7	0	132	1493
5:15 PM	12	31	0	0	4	32	4	0	6	8	17	0	8	9	5	0	136	1502
5:20 PM	11	21	0	0	8	29	6	0	11	5	15	0	9	8	9	0	132	1520
5:25 PM	10	18	1	0	5	23	3	0	11	6	17	0	11	7	6	0	118	1517
5:30 PM	5	33	0	0	3	25	6	0	4	3	10	0	15	7	9	0	120	1535
5:35 PM	13	27	2	0	2	20	1	0	5	7	8	0	13	4	5	0	107	1506
5:40 PM	13	29	0	0	5	17	2	0	3	2	19	0	12	4	6	0	112	1496
5:45 PM	13	28	1	0	5	18	10	0	4	6	22	0	7	10	2	0	126	1493
5:50 PM	17	17	3	0	3	22	5	0	9	8	13	0	5	2	2	0	106	1479
5:55 PM	12	19	4	0	1	20	3	0	8	7	13	0	9	2	9	0	107	1450

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	156	308	16	0	68	360	56	0	80	72	204	0	108	88	84	0	1600
Heavy Trucks	4	0	0		0	4	0		0	0	0		0	0	0		8
Buses																	
Pedestrians		8				8				0				16			32
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scoters																	

Comments:

Report generated on 3/16/2020 3:10 PM

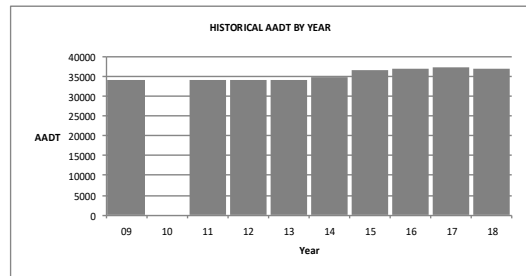
SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

Appendix B: Seasonal Adjustment Factor and ATR Data

Location:	OR99W; MP 21.81; PACIFIC HWYWAY WEST NO. 91; 0.01 mile west of Brutscher Street	Site Name:	Newberg (36-004)
		Installed:	July, 1952

HISTORICAL TRAFFIC DATA

Year	AADT	Percent of AADT				
		Max Day	Max Hour	10TH Hour	20TH Hour	30TH Hour
2009	34060	***	***	***	***	***
2010	***	***	***	***	***	***
2011	34083	120	9.6	9.0	8.9	8.8
2012	33969	122	9.0	8.8	8.7	8.7
2013	34174	113	10.9	8.6	8.4	8.3
2014	34791	122	9.6	8.8	8.7	8.6
2015	36559	***	***	***	***	***
2016	37027	119	9.3	8.3	8.3	8.2
2017	37244	120	10.2	8.6	8.3	8.3
2018	37095	120	9.1	8.7	8.6	8.5



2018 TRAFFIC DATA

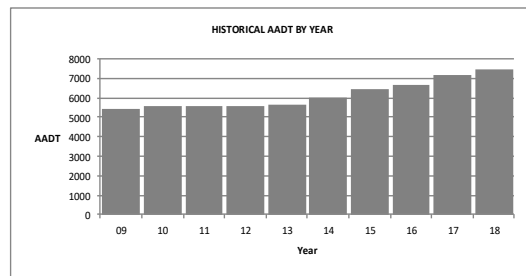
	Average Weekday Traffic	Percent of AADT	Average Daily Traffic	Percent of AADT
January	35790	96	34510	93
February	36291	98	35293	95
March	37978	102	36876	99
April	38627	104	37620	101
May	38138	103	37758	102
June	39663	107	38924	105
July	39537	107	38886	105
August	39941	108	38997	105
September	38655	104	37926	102
October	38204	103	37227	100
November	37451	101	36247	98
December	35928	97	34874	94

For Vehicle Classification data near your project, please go to the following web page:
https://www.oregon.gov/ODOT/Data/Documents/TVT_2018.xlsx

Location:	OR99W; MP 47.45; PACIFIC HIGHWAY WEST NO. 91; 0.07 mile north of Yamhill-Polk County Line	Site Name:	Amity (36-005)
		Installed:	September, 1956

HISTORICAL TRAFFIC DATA

Year	AADT	Percent of AADT				
		Max Day	Max Hour	10TH Hour	20TH Hour	30TH Hour
2009	5453	132	15.0	11.5	11.0	10.7
2010	5594	135	14.7	11.8	11.2	11.0
2011	5553	135	14.5	11.8	11.3	11.1
2012	5556	133	14.6	11.8	11.6	11.4
2013	5644	143	14.5	12.1	11.5	11.2
2014	5970	134	14.0	11.8	11.7	11.5
2015	6431	136	12.5	11.5	11.2	11.0
2016	6632	134	13.2	11.7	11.4	11.2
2017	7159	156	12.5	11.7	11.6	11.3
2018	7464	129	12.8	11.5	11.2	11.1



2018 TRAFFIC DATA

	Average Weekday Traffic	Percent of AADT	Average Daily Traffic	Percent of AADT
January	6998	94	6649	89
February	7485	100	7069	95
March	7627	102	7194	96
April	7895	106	7509	101
May	8037	108	7874	105
June	8127	109	7943	106
July	7969	107	7708	103
August	8177	110	7896	106
September	8091	108	7862	105
October	8144	109	7828	105
November	7796	104	7402	99
December	7044	94	6632	89

For Vehicle Classification data near your project, please go to the following web page:
https://www.oregon.gov/ODOT/Data/Documents/TVT_2018.xlsx

SEASONAL TREND TABLE (Updated: 6/26/19)																									Seasonal Trend Peak Period Factor
TREND	1-Jan	15-Jan	1-Feb	15-Feb	1-Mar	15-Mar	1-Apr	15-Apr	1-May	15-May	1-Jun	15-Jun	1-Jul	15-Jul	1-Aug	15-Aug	1-Sep	15-Sep	1-Oct	15-Oct	1-Nov	15-Nov	1-Dec	15-Dec	
INTERSTATE URBANIZED	1.0419	1.0728	1.0640	1.0552	1.0259	0.9966	0.9896	0.9825	0.9768	0.9711	0.9558	0.9404	0.9561	0.9718	0.9804	0.9890	0.9860	0.9830	0.9864	0.9897	1.0055	1.0213	1.0436	1.0659	0.9404
INTERSTATE NONURBANIZED	1.2583	1.3379	1.2962	1.2545	1.1572	1.0600	1.0383	1.0166	0.9863	0.9561	0.9075	0.8588	0.8422	0.8256	0.8325	0.8394	0.8806	0.9218	0.9559	0.9900	1.0158	1.0416	1.1192	1.1969	0.8256
COMMUTER	1.0577	1.1050	1.0844	1.0638	1.0406	1.0173	0.9975	0.9777	0.9711	0.9645	0.9542	0.9438	0.9544	0.9649	0.9592	0.9535	0.9637	0.9738	0.9737	0.9737	0.9976	1.0215	1.0520	1.0825	0.9438
COASTAL DESTINATION	1.2069	1.2238	1.1889	1.1540	1.1006	1.0472	1.0504	1.0536	1.0125	0.9714	0.9394	0.9074	0.8574	0.8074	0.8100	0.8126	0.8635	0.9145	0.9648	1.0152	1.0683	1.1214	1.1636	1.2058	0.8074
COASTAL DESTINATION ROUTE	1.3738	1.4039	1.3653	1.3267	1.2268	1.1268	1.1203	1.1138	1.0308	0.9478	0.9031	0.8584	0.7781	0.6978	0.7080	0.7182	0.7932	0.8682	0.9574	1.0466	1.1248	1.2030	1.2836	1.3642	0.6978
AGRICULTURE	1.4390	1.5042	1.4606	1.4171	1.3208	1.2246	1.1445	1.0643	0.9843	0.9043	0.8736	0.8429	0.8259	0.8089	0.8114	0.8140	0.7847	0.7554	0.8267	0.8980	0.9879	1.0778	1.2559	1.4339	0.7554
RECREATIONAL SUMMER	1.6714	1.6739	1.6571	1.6403	1.4889	1.3375	1.2642	1.1909	1.0325	0.8742	0.8177	0.7611	0.7119	0.6626	0.6933	0.7239	0.7598	0.7957	0.8898	0.9838	1.1028	1.2218	1.3720	1.5221	0.6626
RECREATIONAL SUMMER WINTER	1.0752	0.9963	1.0200	1.0437	1.0500	1.0563	1.1766	1.2970	1.1496	1.0021	0.9514	0.9006	0.8005	0.7005	0.7590	0.8176	0.9133	1.0091	1.1812	1.3532	1.4605	1.5677	1.2312	0.8948	0.7005
RECREATIONAL WINTER	0.8178	0.6528	0.7315	0.8102	0.8326	0.8549	1.0558	1.2566	1.1918	1.1270	1.1295	1.1321	1.0004	0.8687	0.9344	1.0001	1.0823	1.1646	1.2984	1.4323	1.7685	2.1047	1.4326	0.7605	0.6528
SUMMER	1.2007	1.2609	1.2367	1.2125	1.1528	1.0932	1.0592	1.0252	0.9810	0.9368	0.9061	0.8753	0.8535	0.8317	0.8437	0.8557	0.8872	0.9188	0.9502	0.9816	1.0276	1.0737	1.1341	1.1945	0.8317
SUMMER < 2500	1.2437	1.3130	1.2858	1.2586	1.1886	1.1186	1.0667	1.0147	0.9592	0.9036	0.8816	0.8595	0.8489	0.8382	0.8564	0.8746	0.8721	0.8696	0.9094	0.9491	1.0234	1.0977	1.1930	1.2883	0.8382

*Seasonal Trend Table factors are based on previous year ATR data. The table is updated yearly.

*Grey shading indicates months were seasonal factor is greater than or less than 30%

Appendix C: Existing HCM Results

HCM 6th AWSC
 1: N Springbrook Road & Haworth Avenue/Driveway

03/17/2020

Intersection	
Intersection Delay, s/veh	44.7
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↗		↖	↗	
Traffic Vol, veh/h	79	26	212	26	14	4	105	279	1	15	378	79
Future Vol, veh/h	79	26	212	26	14	4	105	279	1	15	378	79
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles, %	6	4	1	0	8	0	2	9	0	0	6	5
Mvmt Flow	98	32	262	32	17	5	130	344	1	19	467	98
Number of Lanes	0	1	1	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	2
HCM Control Delay	16.1	13.6	21.5	85.8
HCM LOS	C	B	C	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	75%	0%	59%	100%	0%
Vol Thru, %	0%	100%	25%	0%	32%	0%	83%
Vol Right, %	0%	0%	0%	100%	9%	0%	17%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	105	280	105	212	44	15	457
LT Vol	105	0	79	0	26	15	0
Through Vol	0	279	26	0	14	0	378
RT Vol	0	1	0	212	4	0	79
Lane Flow Rate	130	346	130	262	54	19	564
Geometry Grp	7	7	7	7	6	7	7
Degree of Util (X)	0.27	0.684	0.289	0.504	0.132	0.038	1.079
Departure Headway (Hd)	7.787	7.392	8.346	7.203	9.205	7.418	6.886
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	464	491	433	503	392	479	525
Service Time	5.487	5.092	6.046	4.903	7.205	5.214	4.683
HCM Lane V/C Ratio	0.28	0.705	0.3	0.521	0.138	0.04	1.074
HCM Control Delay	13.3	24.6	14.4	17	13.6	10.5	88.3
HCM Lane LOS	B	C	B	C	B	B	F
HCM 95th-tile Q	1.1	5.1	1.2	2.8	0.5	0.1	17.2

HCM 6th Signalized Intersection Summary

2: N Springbrook Road & OR 99W

03/17/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	39	1206	64	252	618	170	154	183	377	400	126	80
Future Volume (veh/h)	39	1206	64	252	618	170	154	183	377	400	126	80
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
Work Zone On Approach		No		No		No		No		No		No
Adj Sat Flow, veh/h/ln	1781	1841	1900	1781	1781	1811	1811	1811	1841	1856	1826	1856
Adj Flow Rate, veh/h	43	1340	0	280	687	0	171	203	419	444	140	89
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	8	4	0	8	8	6	6	6	4	3	5	3
Cap, veh/h	54	1346		330	1533		225	442	380	496	588	505
Arrive On Green	0.03	0.38	0.00	0.10	0.45	0.00	0.07	0.24	0.24	0.14	0.32	0.32
Sat Flow, veh/h	1697	3497	1610	3291	3385	1535	3346	1811	1554	3428	1826	1568
Grp Volume(v), veh/h	43	1340	0	280	687	0	171	203	419	444	140	89
Grp Sat Flow(s),veh/h/ln	1697	1749	1610	1646	1692	1535	1673	1811	1554	1714	1826	1568
Q Serve(g_s), s	3.3	50.0	0.0	11.0	18.2	0.0	6.6	12.5	32.0	16.7	7.4	5.3
Cycle Q Clear(g_c), s	3.3	50.0	0.0	11.0	18.2	0.0	6.6	12.5	32.0	16.7	7.4	5.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	54	1346		330	1533		225	442	380	496	588	505
V/C Ratio(X)	0.79	1.00		0.85	0.45		0.76	0.46	1.10	0.90	0.24	0.18
Avail Cap(c_a), veh/h	207	1346		402	1533		536	442	380	550	588	505
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(l)	1.00	1.00	0.00	0.95	0.95	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	63.0	40.2	0.0	58.0	24.6	0.0	60.1	42.1	49.5	55.1	32.6	31.9
Incr Delay (d2), s/veh	9.1	23.5	0.0	11.0	0.9	0.0	2.0	0.3	77.2	15.2	0.1	0.1
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	1.6	25.3	0.0	5.0	7.4	0.0	2.8	5.6	20.4	8.3	3.3	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.0	63.6	0.0	69.0	25.5	0.0	62.1	42.4	126.7	70.3	32.7	32.0
LnGrp LOS	E	E		E	C		E	D	F	E	C	C
Approach Vol, veh/h		1383	A		967	A		793			673	
Approach Delay, s/veh		63.9			38.1			91.2			57.4	
Approach LOS		E			D			F			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.1	54.9	12.8	46.2	8.2	63.8	22.9	36.0				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	16.0	45.5	21.0	30.0	16.0	45.5	21.0	32.0				
Max Q Clear Time (g_c+1/3), s	11.0	52.0	8.6	9.4	5.3	20.2	18.7	34.0				
Green Ext Time (p_c), s	0.2	0.0	0.2	0.6	0.0	3.2	0.3	0.0				

Intersection Summary

HCM 6th Ctrl Delay	61.9
HCM 6th LOS	E

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary

3: Brutscher Street & OR 99W

03/17/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	2018	20	57	823	27	51	9	150	26	5	26
Future Volume (veh/h)	18	2018	20	57	823	27	51	9	150	26	5	26
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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1633	1841	1515	1767	1781	1663	1707	1352	1352	1589	1307	1307
Adj Flow Rate, veh/h	19	2102	21	59	857	28	53	9	156	27	5	27
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	18	4	26	9	8	16	13	37	37	21	40	40
Cap, veh/h	24	2272	834	75	2297	956	66	10	174	31	25	133
Arrive On Green	0.03	1.00	1.00	0.04	0.68	0.68	0.04	0.16	0.16	0.02	0.14	0.14
Sat Flow, veh/h	1555	3497	1284	1682	3385	1409	1626	63	1092	1513	177	958
Grp Volume(v), veh/h	19	2102	21	59	857	28	53	0	165	27	0	32
Grp Sat Flow(s),veh/h/ln	1555	1749	1284	1682	1692	1409	1626	0	1155	1513	0	1135
Q Serve(g_s), s	1.6	0.0	0.0	4.5	14.3	0.9	4.2	0.0	18.4	2.3	0.0	3.3
Cycle Q Clear(g_c), s	1.6	0.0	0.0	4.5	14.3	0.9	4.2	0.0	18.4	2.3	0.0	3.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.95	1.00		0.84
Lane Grp Cap(c), veh/h	24	2272	834	75	2297	956	66	0	184	31	0	158
V/C Ratio(X)	0.80	0.93	0.03	0.79	0.37	0.03	0.80	0.00	0.90	0.86	0.00	0.20
Avail Cap(c_a), veh/h	131	2272	834	205	2297	956	199	0	282	185	0	260
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.33	0.33	0.33	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	63.3	0.0	0.0	62.0	9.1	6.9	62.3	0.0	54.0	64.0	0.0	49.9
Incr Delay (d2), s/veh	7.5	3.0	0.0	6.8	0.0	0.0	7.9	0.0	15.1	21.2	0.0	0.2
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/lr	0.7	0.9	0.0	2.0	4.7	0.3	1.9	0.0	6.1	1.1	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.8	3.0	0.0	68.8	9.1	6.9	70.2	0.0	69.1	85.2	0.0	50.2
LnGrp LOS	E	A	A	E	A	A	E	A	E	F	A	D
Approach Vol, veh/h	2142			944			218			59		
Approach Delay, s/veh	3.5			12.8			69.4			66.2		
Approach LOS	A			B			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.8	89.6	9.4	22.2	6.0	93.4	6.7	24.9				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	16.0	50.5	16.0	30.0	11.0	55.5	16.0	32.0				
Max Q Clear Time (g_c+10), s	16.5	2.0	6.2	5.3	3.6	16.3	4.3	20.4				
Green Ext Time (p_c), s	0.0	19.6	0.0	0.1	0.0	3.9	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay	11.5
HCM 6th LOS	B

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↖		↗	
Traffic Vol, veh/h	2	2148	906	19	58	27
Future Vol, veh/h	2	2148	906	19	58	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	8	0	0	0
Mvmt Flow	2	2261	954	20	61	28

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	974	0	-	0	2099 487
Stage 1	-	-	-	-	964 -
Stage 2	-	-	-	-	1135 -
Critical Hdwy	4.1	-	-	-	6.8 6.9
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	2.2	-	-	-	3.5 3.3
Pot Cap-1 Maneuver	716	-	-	-	~ 46 532
Stage 1	-	-	-	-	335 -
Stage 2	-	-	-	-	273 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	716	-	-	-	~ 46 532
Mov Cap-2 Maneuver	-	-	-	-	158 -
Stage 1	-	-	-	-	334 -
Stage 2	-	-	-	-	273 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	36
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	716	-	-	-	203
HCM Lane V/C Ratio	0.003	-	-	-	0.441
HCM Control Delay (s)	10	-	-	-	36
HCM Lane LOS	B	-	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	2.1

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

HCM 6th Signalized Intersection Summary

5: Providence Drive & OR 99W

03/17/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (veh/h)	2149	66	74	903	23	60
Future Volume (veh/h)	2149	66	74	903	23	60
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1870	1900	1781	1693	1870
Adj Flow Rate, veh/h	2286	70	79	961	24	64
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	2	0	8	14	2
Cap, veh/h	2670	1210	102	2902	89	87
Arrive On Green	0.76	0.76	0.06	0.86	0.06	0.06
Sat Flow, veh/h	3589	1585	1810	3474	1612	1585
Grp Volume(v), veh/h	2286	70	79	961	24	64
Grp Sat Flow(s),veh/h/ln	1749	1585	1810	1692	1612	1585
Q Serve(g_s), s	53.6	1.3	5.2	6.8	1.7	4.8
Cycle Q Clear(g_c), s	53.6	1.3	5.2	6.8	1.7	4.8
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2670	1210	102	2902	89	87
V/C Ratio(X)	0.86	0.06	0.77	0.33	0.27	0.73
Avail Cap(c_a), veh/h	2670	1210	300	2902	404	398
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.7	3.5	55.9	1.7	54.4	55.8
Incr Delay (d2), s/veh	3.8	0.1	11.8	0.1	1.6	11.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.7	0.3	2.6	0.8	0.7	2.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.5	3.6	67.6	1.8	56.0	66.9
LnGrp LOS	B	A	E	A	E	E
Approach Vol, veh/h	2356			1040	88	
Approach Delay, s/veh	13.2			6.8	63.9	
Approach LOS	B			A	E	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	11.3	97.6			108.9	11.1
Change Period (Y+Rc), s	4.5	6.0			6.0	4.5
Max Green Setting (Gmax), s	19.9	55.0			79.4	30.1
Max Q Clear Time (g_c+I1), s	7.2	55.6			8.8	6.8
Green Ext Time (p_c), s	0.1	0.0			7.8	0.2
Intersection Summary						
HCM 6th Ctrl Delay			12.6			
HCM 6th LOS			B			

HCM 6th AWSC
 1: N Springbrook Road & Haworth Avenue/Driveway

03/27/2020

Intersection	
Intersection Delay, s/veh	48.6
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↗		↖	↗	
Traffic Vol, veh/h	107	65	224	121	87	75	137	337	17	58	361	65
Future Vol, veh/h	107	65	224	121	87	75	137	337	17	58	361	65
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	1	3	1	1	1	0	1	3	0	0	2	0
Mvmt Flow	111	68	233	126	91	78	143	351	18	60	376	68
Number of Lanes	0	1	1	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	2
HCM Control Delay	21.1	37.4	42.3	84.2
HCM LOS	C	E	E	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	62%	0%	43%	100%	0%
Vol Thru, %	0%	95%	38%	0%	31%	0%	85%
Vol Right, %	0%	5%	0%	100%	27%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	137	354	172	224	283	58	426
LT Vol	137	0	107	0	121	58	0
Through Vol	0	337	65	0	87	0	361
RT Vol	0	17	0	224	75	0	65
Lane Flow Rate	143	369	179	233	295	60	444
Geometry Grp	7	7	7	7	6	7	7
Degree of Util (X)	0.364	0.889	0.467	0.544	0.758	0.156	1.069
Departure Headway (Hd)	9.561	9.038	9.774	8.751	9.688	9.272	8.674
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	378	406	371	415	377	385	417
Service Time	7.261	6.738	7.474	6.451	7.688	7.064	6.465
HCM Lane V/C Ratio	0.378	0.909	0.482	0.561	0.782	0.156	1.065
HCM Control Delay	17.6	51.9	20.8	21.4	37.4	13.8	93.8
HCM Lane LOS	C	F	C	C	E	B	F
HCM 95th-tile Q	1.6	9.1	2.4	3.2	6.1	0.5	14.7

HCM 6th Signalized Intersection Summary

2: N Springbrook Road & OR 99W

03/27/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	989	116	444	1459	249	341	220	274	347	203	141
Future Volume (veh/h)	105	989	116	444	1459	249	341	220	274	347	203	141
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		0.99	1.00		0.99
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
Work Zone On Approach		No		No		No		No		No		No
Adj Sat Flow, veh/h/ln	1885	1870	1811	1841	1856	1900	1885	1870	1826	1870	1885	1900
Adj Flow Rate, veh/h	109	1030	0	462	1520	0	355	229	285	361	211	147
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	2	6	4	3	0	1	2	5	2	1	0
Cap, veh/h	133	1483		415	1640		412	400	327	418	408	344
Arrive On Green	0.07	0.42	0.00	0.12	0.47	0.00	0.12	0.21	0.21	0.12	0.22	0.22
Sat Flow, veh/h	1795	3554	1535	3401	3526	1610	3483	1870	1528	3456	1885	1590
Grp Volume(v), veh/h	109	1030	0	462	1520	0	355	229	285	361	211	147
Grp Sat Flow(s),veh/h/ln	1795	1777	1535	1700	1763	1610	1742	1870	1528	1728	1885	1590
Q Serve(g_s), s	7.8	31.2	0.0	16.0	53.1	0.0	13.1	14.4	23.6	13.4	12.9	10.5
Cycle Q Clear(g_c), s	7.8	31.2	0.0	16.0	53.1	0.0	13.1	14.4	23.6	13.4	12.9	10.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	133	1483		415	1640		412	400	327	418	408	344
V/C Ratio(X)	0.82	0.69		1.11	0.93		0.86	0.57	0.87	0.86	0.52	0.43
Avail Cap(c_a), veh/h	219	1483		415	1640		558	457	373	554	432	364
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(l)	1.00	1.00	0.00	0.36	0.36	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	59.8	31.3	0.0	57.5	32.9	0.0	56.7	46.1	49.8	56.5	45.3	44.3
Incr Delay (d2), s/veh	4.6	2.7	0.0	62.9	4.4	0.0	8.0	0.5	16.5	8.6	0.4	0.3
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	3.7	13.7	0.0	10.4	22.9	0.0	6.2	6.7	10.4	6.4	6.2	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.4	34.0	0.0	120.4	37.3	0.0	64.7	46.6	66.3	65.2	45.7	44.6
LnGrp LOS	E	C		F	D		E	D	E	E	D	D
Approach Vol, veh/h		1139	A		1982	A		869			719	
Approach Delay, s/veh		36.9			56.7			60.5			55.2	
Approach LOS		D			E			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	59.2	19.5	32.4	13.7	65.4	19.8	32.0				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	45.5	45.5	21.0	30.0	16.0	45.5	21.0	32.0				
Max Q Clear Time (g_c+11g), s	33.2	33.2	15.1	14.9	9.8	55.1	15.4	25.6				
Green Ext Time (p_c), s	0.0	4.0	0.4	1.0	0.1	0.0	0.4	0.8				

Intersection Summary

HCM 6th Ctrl Delay	52.4
HCM 6th LOS	D

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary

3: Brutscher Street & OR 99W

03/27/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	1180	112	251	1869	53	251	11	163	14	20	60
Future Volume (veh/h)	33	1180	112	251	1869	53	251	11	163	14	20	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.99	1.00		0.99
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
Work Zone On Approach		No		No		No		No		No		No
Adj Sat Flow, veh/h/ln	1811	1841	1900	1870	1841	1900	1870	1900	1900	1900	1826	1826
Adj Flow Rate, veh/h	34	1229	117	261	1947	55	261	11	170	15	21	62
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	6	4	0	2	4	0	2	0	0	0	5	5
Cap, veh/h	43	1889	865	218	2230	1022	218	20	302	23	36	107
Arrive On Green	0.05	1.00	1.00	0.12	0.64	0.64	0.12	0.20	0.20	0.01	0.09	0.09
Sat Flow, veh/h	1725	3497	1601	1781	3497	1603	1781	98	1518	1810	403	1190
Grp Volume(v), veh/h	34	1229	117	261	1947	55	261	0	181	15	0	83
Grp Sat Flow(s),veh/h/ln	1725	1749	1601	1781	1749	1603	1781	0	1616	1810	0	1593
Q Serve(g_s), s	2.6	0.0	0.0	16.0	59.6	1.7	16.0	0.0	13.2	1.1	0.0	6.6
Cycle Q Clear(g_c), s	2.6	0.0	0.0	16.0	59.6	1.7	16.0	0.0	13.2	1.1	0.0	6.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.94	1.00		0.75
Lane Grp Cap(c), veh/h	43	1889	865	218	2230	1022	218	0	322	23	0	143
V/C Ratio(X)	0.80	0.65	0.14	1.20	0.87	0.05	1.20	0.00	0.56	0.65	0.00	0.58
Avail Cap(c_a), veh/h	145	1889	865	218	2230	1022	218	0	395	221	0	365
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.59	0.59	0.59	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	61.9	0.0	0.0	57.5	19.4	8.9	57.5	0.0	47.3	64.4	0.0	57.3
Incr Delay (d2), s/veh	7.3	1.0	0.2	125.4	4.0	0.0	125.4	0.0	0.6	10.6	0.0	1.4
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	1.2	0.3	0.0	14.6	22.4	0.6	14.8	0.0	5.5	0.6	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.2	1.0	0.2	182.9	23.4	8.9	182.9	0.0	47.9	75.0	0.0	58.7
LnGrp LOS	E	A	A	F	C	A	F	A	D	E	A	E
Approach Vol, veh/h		1380			2263			442				98
Approach Delay, s/veh		2.6			41.5			127.6				61.2
Approach LOS		A			D			F				E
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	75.3	20.0	15.7	7.2	88.0	5.7	30.1				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	16.0	50.5	16.0	30.0	11.0	55.5	16.0	32.0				
Max Q Clear Time (g_c+11g), s	11.0	2.0	18.0	8.6	4.6	61.6	3.1	15.2				
Green Ext Time (p_c), s	0.0	7.5	0.0	0.3	0.0	0.0	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay												38.2
HCM 6th LOS												D

HCM 6th TWSC
4: OR 99W & Vittoria Way

03/27/2020

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑↑	↑↑		↘	
Traffic Vol, veh/h	20	1300	2169	95	17	15
Future Vol, veh/h	20	1300	2169	95	17	15
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	5	4	4	1	6	0
Mvmt Flow	21	1340	2236	98	18	15

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	2336	0	-	0	2999 1169
Stage 1	-	-	-	-	2287 -
Stage 2	-	-	-	-	712 -
Critical Hdwy	4.2	-	-	-	6.92 6.9
Critical Hdwy Stg 1	-	-	-	-	5.92 -
Critical Hdwy Stg 2	-	-	-	-	5.92 -
Follow-up Hdwy	2.25	-	-	-	3.56 3.3
Pot Cap-1 Maneuver	199	-	-	-	~ 10 189
Stage 1	-	-	-	-	59 -
Stage 2	-	-	-	-	437 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	199	-	-	-	~ 9 189
Mov Cap-2 Maneuver	-	-	-	-	45 -
Stage 1	-	-	-	-	53 -
Stage 2	-	-	-	-	436 -

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	95.8
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	199	-	-	-	70
HCM Lane V/C Ratio	0.104	-	-	-	0.471
HCM Control Delay (s)	25.2	-	-	-	95.8
HCM Lane LOS	D	-	-	-	F
HCM 95th %tile Q(veh)	0.3	-	-	-	1.9

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

HCM 6th Signalized Intersection Summary

5: Providence Drive & OR 99W

03/27/2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↑
Traffic Volume (veh/h)	1284	33	63	2153	117	106
Future Volume (veh/h)	1284	33	63	2153	117	106
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1856	1841	1870	1870	1900
Adj Flow Rate, veh/h	1338	34	66	2243	122	110
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	4	3	4	2	2	0
Cap, veh/h	2579	1159	85	2926	159	144
Arrive On Green	0.74	0.74	0.05	0.82	0.09	0.09
Sat Flow, veh/h	3589	1571	1753	3647	1781	1610
Grp Volume(v), veh/h	1338	34	66	2243	122	110
Grp Sat Flow(s),veh/h/ln	1749	1571	1753	1777	1781	1610
Q Serve(g_s), s	19.5	0.7	4.5	36.3	8.0	8.0
Cycle Q Clear(g_c), s	19.5	0.7	4.5	36.3	8.0	8.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2579	1159	85	2926	159	144
V/C Ratio(X)	0.52	0.03	0.77	0.77	0.77	0.77
Avail Cap(c_a), veh/h	2579	1159	291	2926	447	404
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.7	4.2	56.4	5.1	53.4	53.4
Incr Delay (d2), s/veh	0.8	0.0	13.8	1.3	7.6	8.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	0.2	2.3	7.6	4.0	3.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	7.5	4.3	70.3	6.3	61.0	61.7
LnGrp LOS	A	A	E	A	E	E
Approach Vol, veh/h	1372			2309	232	
Approach Delay, s/veh	7.4			8.2	61.3	
Approach LOS	A			A	E	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	10.3	94.5			104.8	15.2
Change Period (Y+Rc), s	4.5	6.0			6.0	4.5
Max Green Setting (Gmax), s	19.9	55.0			79.4	30.1
Max Q Clear Time (g_c+I1), s	6.5	21.5			38.3	10.0
Green Ext Time (p_c), s	0.1	11.8			27.9	0.7
Intersection Summary						
HCM 6th Ctrl Delay			11.0			
HCM 6th LOS			B			

Appendix D: Crash Data

URBAN NON-SYSTEM CRASH LISTING

CITY OF NEWBERG, YAMHILL COUNTY

PACIFIC HY 99W at BRUTSCHER ST, City of Newberg, Yamhill County, 01/01/2015 to 12/31/2019

13 - 17 of 28 Crash records shown.

SER#	P	R	J	S	W	DATE	CLASS	CITY STREET	RD CHAR	INT-TYPE	SPCL USE	MOVE	A	S	ACT	EVENT	CAUSE								
INVEST	E	A	U	I	C	O	DIST	FIRST STREET	DIRECT	(MEDIAN)	INT-REL	OFFRD	WTHR	CRASH	TRLR	QTY	FROM	PRTC	INJ	G	E	LICNS	PED		
RD DPT	E	L	G	N	H	R	TIME	SECOND STREET	LOCTN	LEGS	TRAF-	RNDBT	SURF	COLL	OWNER	TO	P#	TYPE	SVRTY	E	X	RES	LOC	ERROR	
UNLOC?	D	C	S	V	L	K	LAT	LRS		(#LANES)	CONTL	DRVWY	LIGHT	SVRTY	V#	TYPE									
															04	NONE	STOP								
																PRVTE	W -E								012
																PSNGR	CAR		01	DRVR	NONE	29	M	OR-Y	000
																								000	
																								00	
88054	N	N	N			11/24/2016	14	BRUTSCHER ST	INTER	3-LEG	N	N	RAIN	ANGL-OTH	01	NONE	0	TURN-R							02
NONE						TH		PACIFIC HY 99W	CN		TRF SIGNAL	N	WET	TURN		PRVTE		SE-NE							000
N						9P			04	0		N	DARK	INJ		PSNGR	CAR		01	DRVR	NONE	18	F	OR-Y	028
N						45 18 28.53	-122 56	009100100S00																	000
							31.38																		00
																									00
																									00
																									00
																									00
00764	N	N	N			07/06/2016	14	BRUTSCHER ST	INTER	3-LEG	N	N	CLD	O-1 L-TURN	01	NONE	9	TURN-L							02,08
CITY						WE		PACIFIC HY 99W	CN		TRF SIGNAL	N	DRY	TURN		N/A		NE-SE							000
N						10P			04	0		N	DLIT	PDO		PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK	000
N						45 18 28.53	-122 56	009100100S00																	000
							31.38																		000
																									00
																									00
																									00
																									00
00479	N	N	N	N	N	05/19/2017	14	BRUTSCHER ST	INTER	3-LEG	N	N	CLR	ANGL-OTH	01	NONE	9	STRGHT							04
CITY						FR		PACIFIC HY 99W	CN		TRF SIGNAL	N	DRY	ANGL		N/A		SE-NW							019
N						6A			01	0		Y	DAWN	PDO		PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK	000
N						45 18 28.53	-122 56	009100100S00																	000
							31.38																		000
																									000
																									00
																									00
																									00
00012	N	N	N			01/05/2018	14	BRUTSCHER ST	INTER	3-LEG	N	N	CLD	O-1 L-TURN	01	NONE	0	TURN-L							02,08
CITY						FR		PACIFIC HY 99W	CN		TRF SIGNAL	N	WET	TURN		PRVTE		SE-SW							000
N						11A			03	0		Y	DAY	INJ		PSNGR	CAR		01	DRVR	INJC	17	M	OR-Y	028,004
N						45 18 28.53	-122 56	009100100S00																	000
							31.38																		000
																									00
																									00
																									00
																									00
																									00
00485	N	N	N	N	N	05/13/2018	14	BRUTSCHER ST	INTER	3-LEG	N	N	CLR	O-1 L-TURN	01	NONE	0	STRGHT							02,08
CITY						SU		PACIFIC HY 99W	CN		TRF SIGNAL	N	DRY	TURN		PRVTE		NW-SE							000
N						5P			03	0		N	DAY	INJ		PSNGR	CAR		01	DRVR	INJB	59	M	OR-Y	000
N						45 18 28.53	-122 56	009100100S00																	000
							31.38																		000
																									00
																									00

Disclaimer: The information contained in this report is compiled from individual driver and police crash reports submitted to the Oregon Department of Transportation as required in ORS 811.720. The Crash Analysis and Reporting Unit is committed to providing the highest quality crash data to customers. However, because submittal of crash report forms is the responsibility of the individual driver, the Crash Analysis and Reporting Unit can not guarantee that all qualifying crashes are represented nor can assurances be made that all details pertaining to a single crash are accurate. Note: Legislative changes to DMV's vehicle crash reporting requirement, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

URBAN NON-SYSTEM CRASH LISTING

CITY OF NEWBERG, YAMHILL COUNTY

PACIFIC HY 99W at PROVIDENCE DR, City of Newberg, Yamhill County, 01/01/2015 to 12/31/2019

5 - 9 of 10 Crash records shown.

SER#	P	R	J	S	W	DATE	CLASS	CITY STREET	RD CHAR	INT-TYPE	SPCL USE	MOVE	A	S	ACT	EVENT	CAUSE												
INVEST	E	A	U	I	C	O	DIST	FIRST STREET	DIRECT	(MEDIAN)	INT-REL	OFFRD	WTHR	CRASH	TRLR	QTY													
RD DPT	E	L	G	N	H	R	FROM	SECOND STREET	LOCTN	LEGS	TRAF-	RNDBT	SURF	COLL	OWNER	FROM	PRTC	INJ	G	E	LICNS	PED							
UNLOC?	D	C	S	V	L	K	LONG	LRS		(#LANES)	CONTL	DRVWY	LIGHT	SVRTY	V#	TYPE	TO	P#	TYPE	SVRTY	E	X	RES	LOC	ERROR				
															02	NONE	0	STOP											
																PRVTE	SW-NE										011		00
																PSNGR	CAR		01	DRVR	NONE	66	M	OR-Y		000	000		00
01343	N	N	N			12/21/2015	14	PROVIDENCE DR	INTER	3-LEG	N	N	CLR	S-1STOP	01	NONE	0	STRGHT											29
NONE						MO		PACIFIC HY 99W	SW		TRF SIGNAL	N	DRY	REAR		PRVTE	SW-NE										000		00
N						12P			06	0		N	DAY	PDO		PSNGR	CAR		01	DRVR	NONE	00	M	UNK		026	000		29
N						45 18 36.11 -122 56 7.77		009100100S00																					
															02	NONE	0	STOP											
																PRVTE	SW-NE										011		00
																PSNGR	CAR		01	DRVR	NONE	32	F	OR-Y		000	000		00
01096	N	N	N			10/10/2017	14	PROVIDENCE DR	INTER	3-LEG	N	N	RAIN	S-1STOP	01	NONE	9	STRGHT											29
NO RPT						TU		PACIFIC HY 99W	SW		TRF SIGNAL	N	WET	REAR		N/A	SW-NE										000		00
N						7P			06	0		N	DLIT	PDO		PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK		000	000		00
N						45 18 36.11 -122 56 7.77		009100100S00																					
															02	NONE	9	STOP											
																N/A	SW-NE										011		00
																PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK		000	000		00
01050	N	N	N	N	N	10/11/2018	14	PROVIDENCE DR	INTER	3-LEG	N	N	CLR	ANGL-OTH	01	NONE		TURN-L											04
CITY						TH		PACIFIC HY 99W	CN		TRF SIGNAL	N	DRY	TURN		PRVTE	S -SW										000		00
N						5P			04	0		N	DAY	INJ		PSNGR	CAR		01	DRVR	INJC	37	F	OR-Y		000	000		00
N						45 18 36.11 -122 56 7.77		009100100S00																					
															02	NONE		STRGHT											
																PRVTE	SW-NE										000		00
																PSNGR	CAR		01	DRVR	NONE	30	F	OR-Y		020	000		04
00699	N	N	N			07/25/2019	14	PROVIDENCE DR	INTER	3-LEG	N	N	CLR	ANGL-OTH	01	NONE		STRGHT											04
CITY						TH		PACIFIC HY 99W	CN		TRF SIGNAL	N	DRY	ANGL		PRVTE	W -E										000		00
N						8A			02	0		N	DAY	INJ		PSNGR	CAR		01	DRVR	INJC	16	M	OR-Y		020	000		04
N						45 18 36.11 -122 56 7.77		009100100S00																					
															02	NONE		TURN-L											
																PRVTE	S -W										000		00
																PSNGR	CAR		01	DRVR	INJB	48	F	OR-Y		000	000		00
00938	N	N	N			09/25/2019	14	PROVIDENCE DR	INTER	3-LEG	N	N	CLR	S-1TURN	01	NONE		STRGHT											07
CITY						WE		PACIFIC HY 99W	CN		TRF SIGNAL	N	DRY	REAR		PRVTE	W -E										000		00
N						8P			03	0		N	DLIT	INJ		PSNGR	CAR		01	DRVR	INJC	34	F	OR-Y		019,042	000		07
N						45 18 35.85 -122 56 8.56		009100100S00																					

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URBAN NON-SYSTEM CRASH LISTING

CITY OF NEWBERG, YAMHILL COUNTY

HAWORTH AVE at SPRINGBROOK RD, City of Newberg, Yamhill County, 01/01/2015 to 12/31/2019

18 - 22 of 23 Crash records shown.

SER#	S	D	M	P	R	J	S	W	DATE	CLASS	CITY STREET	INT-TYPE	SPCL USE	ACT	EVENT	CAUSE														
INVEST	E	A	U	I	C	O	DAY	DIST	FIRST STREET	RD CHAR	(MEDIAN)	INT-REL	OFFRD	WTHR	CRASH	TRLR QTY	MOVE	A	S											
RD DPT	E	L	G	N	H	R	TIME	FROM	SECOND STREET	DIRECT	LEGS	TRAF-	RNDBT	SURF	COLL	OWNER	FROM	PRTC	INJ	G	E	LICNS	PED							
UNLOC?	D	C	S	V	L	K	LAT	LONG	LRS	LOCTN	(#LANES)	CONTL	DRVWY	LIGHT	SVRTY	V#	TYPE	TO	P#	TYPE	SVRTY	E	X	RES	LOC	ERROR	ACT	EVENT	CAUSE	
01259	N	N	N				12/06/2018	17	HAWORTH AVE	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE	9	STRGHT											02
NO RPT							TH	0	SPRINGBROOK RD	CN		STOP SIGN	N	DRY	ANGL	N/A	S	-N									000		00	
N							6P			04	0		N	DLIT	PDO	PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK		000		000	00	
N							45 18 28.76	-122 56																						
							48.96																							
																02	NONE	9	STRGHT											
																N/A	W	-E									015		00	
																PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK		000		000	00	
01330	N	N	N				12/25/2018	16	HAWORTH AVE	INTER	CROSS	N	N	RAIN	ANGL-OTH	01	NONE	9	STRGHT											02
NONE							TU	0	SPRINGBROOK RD	CN		STOP SIGN	N	WET	ANGL	N/A	E	-W									015		00	
N							5P			01	0		N	DLIT	PDO	PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK		000		000	00	
N							45 18 28.73	-122 56																						
							48.98																							
																02	NONE	9	STRGHT											
																N/A	N	-S									015		00	
																PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK		000		000	00	
00401	N	N	N				05/02/2019	16	HAWORTH AVE	INTER	3-LEG	N	N	CLR	ANGL-OTH	01	NONE		STRGHT											02
NONE							TH	0	SPRINGBROOK RD	CN		STOP SIGN	N	DRY	ANGL	PRVTE	S	-N									015		00	
N							2P			04	0		N	DAY	INJ	PSNGR	CAR		01	DRVR	NONE	79	M	OR-Y		028		000	02	
N							45 18 28.73	-122 56																						
							48.98																							
																02	NONE		STRGHT											
																PRVTE	W	-E									000		00	
																PSNGR	CAR		01	DRVR	INJC	55	F	OR-Y		000		000	00	
90218	N	N	N	N			04/05/2019	16	HAWORTH AVE	INTER	3-LEG	N	N	RAIN	O-1 L-TURN	01	NONE	9	STRGHT											02
CITY							FR	0	SPRINGBROOK RD	CN		STOP SIGN	N	WET	TURN	N/A	N	-S									015		00	
N							11A			01	0		N	DAY	PDO	PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK		000		000	00	
N							45 18 28.74	-122 56 49																						
																02	NONE	9	TURN-L											
																N/A	S	-W									000		00	
																PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK		000		000	00	
00750	N	N	N	N	N		08/07/2019	16	HAWORTH AVE	INTER	CROSS	N	N	CLR	ANGL-OTH	01	NONE	9	STRGHT											03
CITY							WE	0	SPRINGBROOK RD	CN		STOP SIGN	N	DRY	ANGL	N/A	W	-E									000		00	
N							10A			03	0		N	DAY	PDO	PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK		000		000	00	
N							45 18 28.73	-122 56 49																						
																02	NONE	9	STRGHT											
																N/A	N	-S									000		000	00
																PSNGR	CAR		01	DRVR	NONE	00	Unk	UNK		000		000	00	

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Appendix E: Future HCM Reports

HCM 6th AWSC
1: N Springbrook Road & Haworth Avenue/Driveway

11/03/2021

Intersection	
Intersection Delay, s/veh	54.1
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↗		↖	↗	
Traffic Vol, veh/h	82	27	221	27	15	4	109	290	1	16	393	82
Future Vol, veh/h	82	27	221	27	15	4	109	290	1	16	393	82
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles, %	6	4	1	0	8	0	2	9	0	0	6	5
Mvmt Flow	101	33	273	33	19	5	135	358	1	20	485	101
Number of Lanes	0	1	1	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	2
HCM Control Delay	17	14	23.7	107.5
HCM LOS	C	B	C	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	75%	0%	59%	100%	0%
Vol Thru, %	0%	100%	25%	0%	33%	0%	83%
Vol Right, %	0%	0%	0%	100%	9%	0%	17%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	109	291	109	221	46	16	475
LT Vol	109	0	82	0	27	16	0
Through Vol	0	290	27	0	15	0	393
RT Vol	0	1	0	221	4	0	82
Lane Flow Rate	135	359	135	273	57	20	586
Geometry Grp	7	7	7	7	6	7	7
Degree of Util (X)	0.284	0.72	0.303	0.53	0.14	0.041	1.144
Departure Headway (Hd)	7.947	7.552	8.501	7.355	9.476	7.557	7.026
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	455	481	425	494	380	472	516
Service Time	5.647	5.252	6.201	5.055	7.476	5.341	4.809
HCM Lane V/C Ratio	0.297	0.746	0.318	0.553	0.15	0.042	1.136
HCM Control Delay	13.8	27.4	14.9	18	14	10.7	110.8
HCM Lane LOS	B	D	B	C	B	B	F
HCM 95th-tile Q	1.2	5.7	1.3	3.1	0.5	0.1	20

HCM 6th Signalized Intersection Summary

2: N Springbrook Road & OR 99W

11/03/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	1254	66	262	642	177	160	191	392	416	131	83
Future Volume (veh/h)	40	1254	66	262	642	177	160	191	392	416	131	83
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
Work Zone On Approach		No		No		No		No		No		No
Adj Sat Flow, veh/h/ln	1781	1841	1900	1781	1781	1811	1811	1811	1841	1856	1826	1856
Adj Flow Rate, veh/h	44	1393	0	291	713	0	178	212	436	462	146	92
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	8	4	0	8	8	6	6	6	4	3	5	3
Cap, veh/h	56	1318		340	1515		232	442	380	512	592	509
Arrive On Green	0.03	0.38	0.00	0.10	0.45	0.00	0.07	0.24	0.24	0.15	0.32	0.32
Sat Flow, veh/h	1697	3497	1610	3291	3385	1535	3346	1811	1554	3428	1826	1568
Grp Volume(v), veh/h	44	1393	0	291	713	0	178	212	436	462	146	92
Grp Sat Flow(s),veh/h/ln	1697	1749	1610	1646	1692	1535	1673	1811	1554	1714	1826	1568
Q Serve(g_s), s	3.4	49.4	0.0	11.4	19.3	0.0	6.9	13.1	32.0	17.4	7.7	5.5
Cycle Q Clear(g_c), s	3.4	49.4	0.0	11.4	19.3	0.0	6.9	13.1	32.0	17.4	7.7	5.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	56	1318		340	1515		232	442	380	512	592	509
V/C Ratio(X)	0.79	1.06		0.85	0.47		0.77	0.48	1.15	0.90	0.25	0.18
Avail Cap(c_a), veh/h	207	1318		402	1515		536	442	380	550	592	509
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	1.00	0.00	0.94	0.94	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.9	40.8	0.0	57.8	25.3	0.0	59.9	42.4	49.5	54.8	32.5	31.8
Incr Delay (d2), s/veh	8.8	41.2	0.0	12.1	1.0	0.0	2.0	0.3	93.1	16.6	0.1	0.1
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	1.6	28.3	0.0	5.3	7.9	0.0	3.0	5.9	22.1	8.7	3.5	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.7	82.1	0.0	69.9	26.3	0.0	62.0	42.7	142.6	71.4	32.6	31.8
LnGrp LOS	E	F		E	C		E	D	F	E	C	C
Approach Vol, veh/h		1437	A		1004	A		826			700	
Approach Delay, s/veh		81.7			38.9			99.6			58.1	
Approach LOS		F			D			F			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.6	53.9	13.1	46.5	8.3	63.1	23.6	36.0				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	16.0	45.5	21.0	30.0	16.0	45.5	21.0	32.0				
Max Q Clear Time (g_c+1/3), s	13.4	51.4	8.9	9.7	5.4	21.3	19.4	34.0				
Green Ext Time (p_c), s	0.2	0.0	0.2	0.7	0.0	3.3	0.2	0.0				

Intersection Summary

HCM 6th Ctrl Delay	70.5
HCM 6th LOS	E

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary

3: Brutscher Street & OR 99W

11/03/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↑	↗	↘	↗	↘
Traffic Volume (veh/h)	19	2098	21	59	856	28	53	9	156	27	6	27
Future Volume (veh/h)	19	2098	21	59	856	28	53	9	156	27	6	27
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1633	1841	1515	1767	1781	1663	1707	1352	1885	1589	1307	1648
Adj Flow Rate, veh/h	20	2185	22	61	892	29	55	9	162	28	6	28
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	18	4	26	9	8	16	13	37	1	21	40	17
Cap, veh/h	25	2246	824	77	2275	947	69	10	180	33	29	135
Arrive On Green	0.03	1.00	1.00	0.05	0.67	0.67	0.04	0.16	0.16	0.02	0.14	0.14
Sat Flow, veh/h	1555	3497	1284	1682	3385	1409	1626	61	1094	1513	201	938
Grp Volume(v), veh/h	20	2185	22	61	892	29	55	0	171	28	0	34
Grp Sat Flow(s),veh/h/ln	1555	1749	1284	1682	1692	1409	1626	0	1155	1513	0	1138
Q Serve(g_s), s	1.7	0.0	0.0	4.7	15.4	0.9	4.4	0.0	19.0	2.4	0.0	3.5
Cycle Q Clear(g_c), s	1.7	0.0	0.0	4.7	15.4	0.9	4.4	0.0	19.0	2.4	0.0	3.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.95	1.00		0.82
Lane Grp Cap(c), veh/h	25	2246	824	77	2275	947	69	0	190	33	0	164
V/C Ratio(X)	0.81	0.97	0.03	0.79	0.39	0.03	0.80	0.00	0.90	0.86	0.00	0.21
Avail Cap(c_a), veh/h	131	2246	824	205	2275	947	199	0	282	185	0	261
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.23	0.23	0.23	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	63.2	0.0	0.0	61.9	9.6	7.2	62.2	0.0	53.7	63.9	0.0	49.5
Incr Delay (d2), s/veh	5.6	4.8	0.0	6.6	0.0	0.0	7.6	0.0	17.1	20.1	0.0	0.2
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	0.7	1.5	0.0	2.1	5.1	0.3	2.0	0.0	6.5	1.1	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.8	4.8	0.0	68.5	9.6	7.2	69.8	0.0	70.7	84.0	0.0	49.7
LnGrp LOS	E	A	A	E	A	A	E	A	E	F	A	D
Approach Vol, veh/h		2227			982			226				62
Approach Delay, s/veh		5.3			13.2			70.5				65.2
Approach LOS		A			B			E				E
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	0.0	88.6	9.6	22.8	6.1	92.6	6.8	25.5				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	16.0	50.5	16.0	30.0	11.0	55.5	16.0	32.0				
Max Q Clear Time (g_c+1/3), s	16.0	2.0	6.4	5.5	3.7	17.4	4.4	21.0				
Green Ext Time (p_c), s	0.0	21.2	0.0	0.1	0.0	4.1	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay	12.8
HCM 6th LOS	B

HCM 6th TWSC
4: OR 99W & Vittoria Way

11/03/2021

Intersection

Int Delay, s/veh 1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑↑	↑↑		↘	
Traffic Vol, veh/h	2	2234	943	20	61	28
Future Vol, veh/h	2	2234	943	20	61	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	8	0	0	0
Mvmt Flow	2	2352	993	21	64	29

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1014	0	0 2184 507
Stage 1	-	-	- 1004 -
Stage 2	-	-	- 1180 -
Critical Hdwy	4.1	-	- 6.8 6.9
Critical Hdwy Stg 1	-	-	- 5.8 -
Critical Hdwy Stg 2	-	-	- 5.8 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	692	-	- ~ 40 516
Stage 1	-	-	- 320 -
Stage 2	-	-	- 258 -
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	692	-	- ~ 40 516
Mov Cap-2 Maneuver	-	-	- 148 -
Stage 1	-	-	- 319 -
Stage 2	-	-	- 258 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	40.7
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	692	-	-	-	191
HCM Lane V/C Ratio	0.003	-	-	-	0.49
HCM Control Delay (s)	10.2	-	-	-	40.7
HCM Lane LOS	B	-	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	2.4

Notes

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

HCM 6th Signalized Intersection Summary
5: Providence Drive & OR 99W

11/03/2021



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (veh/h)	2235	68	77	939	24	63
Future Volume (veh/h)	2235	68	77	939	24	63
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1870	1900	1781	1693	1870
Adj Flow Rate, veh/h	2378	72	82	999	26	67
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	2	0	8	14	2
Cap, veh/h	2655	1203	106	2894	93	91
Arrive On Green	0.76	0.76	0.06	0.85	0.06	0.06
Sat Flow, veh/h	3589	1585	1810	3474	1612	1585
Grp Volume(v), veh/h	2378	72	82	999	26	67
Grp Sat Flow(s),veh/h/ln	1749	1585	1810	1692	1612	1585
Q Serve(g_s), s	61.4	1.4	5.4	7.3	1.9	5.0
Cycle Q Clear(g_c), s	61.4	1.4	5.4	7.3	1.9	5.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2655	1203	106	2894	93	91
V/C Ratio(X)	0.90	0.06	0.78	0.35	0.28	0.73
Avail Cap(c_a), veh/h	2655	1203	300	2894	404	398
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.9	3.6	55.7	1.8	54.2	55.6
Incr Delay (d2), s/veh	5.2	0.1	11.5	0.1	1.6	10.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.6	0.4	2.7	0.9	0.8	2.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.1	3.7	67.3	1.9	55.8	66.5
LnGrp LOS	B	A	E	A	E	E
Approach Vol, veh/h	2450			1081	93	
Approach Delay, s/veh	15.7			6.8	63.5	
Approach LOS	B			A	E	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	11.5	97.1			108.6	11.4
Change Period (Y+Rc), s	4.5	6.0			6.0	4.5
Max Green Setting (Gmax), s	19.9	55.0			79.4	30.1
Max Q Clear Time (g_c+I1), s	7.4	63.4			9.3	7.0
Green Ext Time (p_c), s	0.1	0.0			8.2	0.2

Intersection Summary

HCM 6th Ctrl Delay	14.3
HCM 6th LOS	B

HCM 6th AWSC
1: N Springbrook Road & Haworth Avenue/Driveway

11/17/2021

Intersection	
Intersection Delay, s/veh	59.6
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↗		↖	↗	
Traffic Vol, veh/h	111	67	233	126	91	78	142	351	18	61	375	67
Future Vol, veh/h	111	67	233	126	91	78	142	351	18	61	375	67
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	1	3	1	1	1	0	1	3	0	0	2	0
Mvmt Flow	116	70	243	131	95	81	148	366	19	64	391	70
Number of Lanes	0	1	1	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	2
HCM Control Delay	22.9	43.8	51.6	107.1
HCM LOS	C	E	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	62%	0%	43%	100%	0%
Vol Thru, %	0%	95%	38%	0%	31%	0%	85%
Vol Right, %	0%	5%	0%	100%	26%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	142	369	178	233	295	61	442
LT Vol	142	0	111	0	126	61	0
Through Vol	0	351	67	0	91	0	375
RT Vol	0	18	0	233	78	0	67
Lane Flow Rate	148	384	185	243	307	64	460
Geometry Grp	7	7	7	7	6	7	7
Degree of Util (X)	0.385	0.947	0.493	0.579	0.806	0.169	1.145
Departure Headway (Hd)	9.858	9.333	10.08	9.054	10.01	9.548	8.95
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	367	392	360	400	366	376	405
Service Time	7.558	7.033	7.78	6.754	8.01	7.309	6.71
HCM Lane V/C Ratio	0.403	0.98	0.514	0.608	0.839	0.17	1.136
HCM Control Delay	18.6	64.3	22.2	23.5	43.8	14.3	119.9
HCM Lane LOS	C	F	C	C	E	B	F
HCM 95th-tile Q	1.8	10.5	2.6	3.5	6.9	0.6	17.2

HCM 6th Signalized Intersection Summary

2: N Springbrook Road & OR 99W

11/17/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	109	1029	121	462	1517	259	354	229	285	361	211	147
Future Volume (veh/h)	109	1029	121	462	1517	259	354	229	285	361	211	147
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		0.99	1.00		0.99
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1870	1811	1841	1856	1900	1885	1870	1826	1870	1885	1900
Adj Flow Rate, veh/h	114	1072	0	481	1580	0	369	239	297	376	220	153
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	2	6	4	3	0	1	2	5	2	1	0
Cap, veh/h	138	1448		415	1596		426	410	335	432	419	353
Arrive On Green	0.08	0.41	0.00	0.12	0.45	0.00	0.12	0.22	0.22	0.13	0.22	0.22
Sat Flow, veh/h	1795	3554	1535	3401	3526	1610	3483	1870	1528	3456	1885	1591
Grp Volume(v), veh/h	114	1072	0	481	1580	0	369	239	297	376	220	153
Grp Sat Flow(s),veh/h/ln	1795	1777	1535	1700	1763	1610	1742	1870	1528	1728	1885	1591
Q Serve(g_s), s	8.2	33.5	0.0	16.0	58.2	0.0	13.6	15.0	24.7	14.0	13.5	10.8
Cycle Q Clear(g_c), s	8.2	33.5	0.0	16.0	58.2	0.0	13.6	15.0	24.7	14.0	13.5	10.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	138	1448		415	1596		426	410	335	432	419	353
V/C Ratio(X)	0.82	0.74		1.16	0.99		0.87	0.58	0.89	0.87	0.53	0.43
Avail Cap(c_a), veh/h	219	1448		415	1596		558	457	373	554	432	364
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	1.00	0.00	0.28	0.28	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	59.6	32.9	0.0	57.5	35.6	0.0	56.5	45.8	49.5	56.3	44.9	43.8
Incr Delay (d2), s/veh	6.6	3.4	0.0	79.1	9.9	0.0	9.0	0.7	19.0	9.8	0.5	0.3
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	4.0	14.9	0.0	11.4	26.3	0.0	6.5	7.0	11.1	6.7	6.4	4.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.1	36.4	0.0	136.6	45.4	0.0	65.5	46.5	68.5	66.0	45.3	44.2
LnGrp LOS	E	D		F	D		E	D	E	E	D	D
Approach Vol, veh/h		1186	A		2061	A		905			749	
Approach Delay, s/veh		39.2			66.7			61.5			55.5	
Approach LOS		D			E			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	57.9	20.0	33.1	14.1	63.8	20.4	32.7				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	45.0	45.5	21.0	30.0	16.0	45.5	21.0	32.0				
Max Q Clear Time (g_c+11g), s	11.0	35.5	15.6	15.5	10.2	60.2	16.0	26.7				
Green Ext Time (p_c), s	0.0	3.8	0.4	1.0	0.1	0.0	0.4	0.8				

Intersection Summary

HCM 6th Ctrl Delay	57.4
HCM 6th LOS	E

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary

3: Brutscher Street & OR 99W

11/17/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	1227	117	261	1943	55	261	11	169	15	21	63
Future Volume (veh/h)	35	1227	117	261	1943	55	261	11	169	15	21	63
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.99	1.00		0.99
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
Work Zone On Approach		No		No		No		No		No		No
Adj Sat Flow, veh/h/ln	1811	1841	1900	1870	1841	1900	1870	1900	1885	1900	1826	1870
Adj Flow Rate, veh/h	36	1278	122	272	2024	57	272	11	176	16	22	66
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	6	4	0	2	4	0	2	0	1	0	5	2
Cap, veh/h	45	1879	860	218	2215	1015	218	19	306	24	37	110
Arrive On Green	0.05	1.00	1.00	0.12	0.63	0.63	0.12	0.20	0.20	0.01	0.09	0.09
Sat Flow, veh/h	1725	3497	1601	1781	3497	1603	1781	95	1521	1810	398	1194
Grp Volume(v), veh/h	36	1278	122	272	2024	57	272	0	187	16	0	88
Grp Sat Flow(s),veh/h/ln	1725	1749	1601	1781	1749	1603	1781	0	1616	1810	0	1592
Q Serve(g_s), s	2.7	0.0	0.0	16.0	66.0	1.8	16.0	0.0	13.7	1.2	0.0	7.0
Cycle Q Clear(g_c), s	2.7	0.0	0.0	16.0	66.0	1.8	16.0	0.0	13.7	1.2	0.0	7.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.94	1.00		0.75
Lane Grp Cap(c), veh/h	45	1879	860	218	2215	1015	218	0	325	24	0	147
V/C Ratio(X)	0.79	0.68	0.14	1.25	0.91	0.06	1.25	0.00	0.58	0.66	0.00	0.60
Avail Cap(c_a), veh/h	145	1879	860	218	2215	1015	218	0	395	221	0	365
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.52	0.52	0.52	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	61.7	0.0	0.0	57.5	20.9	9.1	57.5	0.0	47.3	64.3	0.0	57.1
Incr Delay (d2), s/veh	6.0	1.1	0.2	144.8	6.3	0.0	144.8	0.0	0.6	10.6	0.0	1.4
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	1.2	0.3	0.0	15.8	25.4	0.6	16.0	0.0	5.6	0.6	0.0	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.7	1.1	0.2	202.3	27.2	9.1	202.3	0.0	47.9	74.9	0.0	58.6
LnGrp LOS	E	A	A	F	C	A	F	A	D	E	A	E
Approach Vol, veh/h		1436			2353			459			104	
Approach Delay, s/veh		2.6			47.0			139.4			61.1	
Approach LOS		A			D			F			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	74.9	20.0	16.1	7.4	87.4	5.8	30.3				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	16.0	50.5	16.0	30.0	11.0	55.5	16.0	32.0				
Max Q Clear Time (g_c+11g), s	11.0	2.0	18.0	9.0	4.7	68.0	3.2	15.7				
Green Ext Time (p_c), s	0.0	8.0	0.0	0.3	0.0	0.0	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay				42.4								
HCM 6th LOS				D								

HCM 6th TWSC
4: OR 99W & Vittoria Way

11/17/2021

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑↑	↑↑		↘	
Traffic Vol, veh/h	21	1352	2255	99	18	16
Future Vol, veh/h	21	1352	2255	99	18	16
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	5	4	4	1	6	0
Mvmt Flow	22	1394	2325	102	19	16

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	2429	0	-	0	3119 1216
Stage 1	-	-	-	-	2378 -
Stage 2	-	-	-	-	741 -
Critical Hdwy	4.2	-	-	-	6.92 6.9
Critical Hdwy Stg 1	-	-	-	-	5.92 -
Critical Hdwy Stg 2	-	-	-	-	5.92 -
Follow-up Hdwy	2.25	-	-	-	3.56 3.3
Pot Cap-1 Maneuver	183	-	-	-	~ 8 176
Stage 1	-	-	-	-	53 -
Stage 2	-	-	-	-	422 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	183	-	-	-	~ 7 176
Mov Cap-2 Maneuver	-	-	-	-	40 -
Stage 1	-	-	-	-	47 -
Stage 2	-	-	-	-	421 -

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	118.1
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	183	-	-	-	63
HCM Lane V/C Ratio	0.118	-	-	-	0.556
HCM Control Delay (s)	27.3	-	-	-	118.1
HCM Lane LOS	D	-	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	2.3

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

HCM 6th Signalized Intersection Summary
5: Providence Drive & OR 99W

11/17/2021



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵	↑
Traffic Volume (veh/h)	1355	35	65	2238	122	110
Future Volume (veh/h)	1355	35	65	2238	122	110
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1856	1841	1870	1870	1900
Adj Flow Rate, veh/h	1411	36	68	2331	127	115
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	4	3	4	2	2	0
Cap, veh/h	2563	1151	88	2915	164	149
Arrive On Green	0.73	0.73	0.05	0.82	0.09	0.09
Sat Flow, veh/h	3589	1571	1753	3647	1781	1610
Grp Volume(v), veh/h	1411	36	68	2331	127	115
Grp Sat Flow(s),veh/h/ln	1749	1571	1753	1777	1781	1610
Q Serve(g_s), s	21.7	0.8	4.6	41.1	8.4	8.4
Cycle Q Clear(g_c), s	21.7	0.8	4.6	41.1	8.4	8.4
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2563	1151	88	2915	164	149
V/C Ratio(X)	0.55	0.03	0.78	0.80	0.77	0.77
Avail Cap(c_a), veh/h	2563	1151	291	2915	447	404
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.2	4.4	56.3	5.6	53.2	53.2
Incr Delay (d2), s/veh	0.9	0.1	13.5	1.7	7.5	8.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	0.2	2.3	8.9	4.1	3.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	8.0	4.4	69.9	7.3	60.7	61.6
LnGrp LOS	A	A	E	A	E	E
Approach Vol, veh/h	1447			2399	242	
Approach Delay, s/veh	8.0			9.1	61.1	
Approach LOS	A			A	E	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	10.5	93.9			104.4	15.6
Change Period (Y+Rc), s	4.5	6.0			6.0	4.5
Max Green Setting (Gmax), s	19.9	55.0			79.4	30.1
Max Q Clear Time (g_c+I1), s	6.6	23.7			43.1	10.4
Green Ext Time (p_c), s	0.1	12.4			26.8	0.7

Intersection Summary

HCM 6th Ctrl Delay			11.8			
HCM 6th LOS			B			

HCM 6th AWSC
1: N Springbrook Road & Haworth Avenue/Driveway

11/03/2021

Intersection	
Intersection Delay, s/veh	54.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↗		↖	↗	
Traffic Vol, veh/h	82	27	221	27	15	4	109	290	1	16	394	82
Future Vol, veh/h	82	27	221	27	15	4	109	290	1	16	394	82
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles, %	6	4	1	0	8	0	2	9	0	0	6	5
Mvmt Flow	101	33	273	33	19	5	135	358	1	20	486	101
Number of Lanes	0	1	1	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	2
HCM Control Delay	17	14	23.7	108.6
HCM LOS	C	B	C	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	75%	0%	59%	100%	0%
Vol Thru, %	0%	100%	25%	0%	33%	0%	83%
Vol Right, %	0%	0%	0%	100%	9%	0%	17%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	109	291	109	221	46	16	476
LT Vol	109	0	82	0	27	16	0
Through Vol	0	290	27	0	15	0	394
RT Vol	0	1	0	221	4	0	82
Lane Flow Rate	135	359	135	273	57	20	588
Geometry Grp	7	7	7	7	6	7	7
Degree of Util (X)	0.284	0.72	0.303	0.53	0.14	0.041	1.147
Departure Headway (Hd)	7.951	7.555	8.505	7.359	9.483	7.557	7.026
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	455	481	425	494	380	472	517
Service Time	5.651	5.255	6.205	5.059	7.483	5.341	4.809
HCM Lane V/C Ratio	0.297	0.746	0.318	0.553	0.15	0.042	1.137
HCM Control Delay	13.8	27.4	14.9	18.1	14	10.7	111.9
HCM Lane LOS	B	D	B	C	B	B	F
HCM 95th-tile Q	1.2	5.7	1.3	3.1	0.5	0.1	20.1

HCM 6th Signalized Intersection Summary

2: N Springbrook Road & OR 99W

11/03/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	1257	66	263	644	177	160	191	393	417	131	83
Future Volume (veh/h)	40	1257	66	263	644	177	160	191	393	417	131	83
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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1781	1841	1900	1781	1781	1811	1811	1811	1841	1856	1826	1856
Adj Flow Rate, veh/h	44	1397	0	292	716	0	178	212	437	463	146	92
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	8	4	0	8	8	6	6	6	4	3	5	3
Cap, veh/h	56	1316		341	1514		232	442	380	513	593	509
Arrive On Green	0.03	0.38	0.00	0.10	0.45	0.00	0.07	0.24	0.24	0.15	0.32	0.32
Sat Flow, veh/h	1697	3497	1610	3291	3385	1535	3346	1811	1554	3428	1826	1568
Grp Volume(v), veh/h	44	1397	0	292	716	0	178	212	437	463	146	92
Grp Sat Flow(s),veh/h/ln	1697	1749	1610	1646	1692	1535	1673	1811	1554	1714	1826	1568
Q Serve(g_s), s	3.4	49.3	0.0	11.4	19.4	0.0	6.9	13.1	32.0	17.4	7.7	5.5
Cycle Q Clear(g_c), s	3.4	49.3	0.0	11.4	19.4	0.0	6.9	13.1	32.0	17.4	7.7	5.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	56	1316		341	1514		232	442	380	513	593	509
V/C Ratio(X)	0.79	1.06		0.86	0.47		0.77	0.48	1.15	0.90	0.25	0.18
Avail Cap(c_a), veh/h	207	1316		402	1514		536	442	380	550	593	509
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(l)	1.00	1.00	0.00	0.94	0.94	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.9	40.8	0.0	57.7	25.4	0.0	59.9	42.4	49.5	54.8	32.5	31.7
Incr Delay (d2), s/veh	8.8	42.8	0.0	12.2	1.0	0.0	2.0	0.3	94.1	16.7	0.1	0.1
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	1.6	28.5	0.0	5.3	7.9	0.0	3.0	5.9	22.2	8.8	3.5	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.7	83.7	0.0	70.0	26.4	0.0	62.0	42.7	143.6	71.5	32.5	31.8
LnGrp LOS	E	F		E	C		E	D	F	E	C	C
Approach Vol, veh/h	1441		A	1008		A	827		701			
Approach Delay, s/veh	83.3			39.0			100.1		58.1			
Approach LOS	F			D			F		E			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.6	53.8	13.1	46.5	8.3	63.1	23.6	36.0				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	16.0	45.5	21.0	30.0	16.0	45.5	21.0	32.0				
Max Q Clear Time (g_c+1/3), s	13.4	51.3	8.9	9.7	5.4	21.4	19.4	34.0				
Green Ext Time (p_c), s	0.2	0.0	0.2	0.7	0.0	3.3	0.2	0.0				

Intersection Summary

HCM 6th Ctrl Delay	71.1
HCM 6th LOS	E

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary

3: Brutscher Street & OR 99W

11/03/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	2098	26	71	856	28	56	9	164	27	6	27
Future Volume (veh/h)	19	2098	26	71	856	28	56	9	164	27	6	27
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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1633	1841	1515	1767	1781	1663	1707	1352	1885	1589	1307	1648
Adj Flow Rate, veh/h	20	2185	27	74	892	29	58	9	171	28	6	28
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	18	4	26	9	8	16	13	37	1	21	40	17
Cap, veh/h	25	2186	802	93	2249	936	73	10	189	33	30	140
Arrive On Green	0.03	1.00	1.00	0.06	0.66	0.66	0.04	0.17	0.17	0.02	0.15	0.15
Sat Flow, veh/h	1555	3497	1284	1682	3385	1409	1626	58	1097	1513	201	938
Grp Volume(v), veh/h	20	2185	27	74	892	29	58	0	180	28	0	34
Grp Sat Flow(s),veh/h/ln	1555	1749	1284	1682	1692	1409	1626	0	1154	1513	0	1138
Q Serve(g_s), s	1.7	0.0	0.0	5.7	15.7	0.9	4.6	0.0	20.0	2.4	0.0	3.4
Cycle Q Clear(g_c), s	1.7	0.0	0.0	5.7	15.7	0.9	4.6	0.0	20.0	2.4	0.0	3.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.95	1.00		0.82
Lane Grp Cap(c), veh/h	25	2186	802	93	2249	936	73	0	199	33	0	170
V/C Ratio(X)	0.81	1.00	0.03	0.80	0.40	0.03	0.80	0.00	0.91	0.86	0.00	0.20
Avail Cap(c_a), veh/h	131	2186	802	205	2249	936	199	0	282	185	0	261
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.23	0.23	0.23	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	63.2	0.0	0.0	61.2	10.0	7.5	62.0	0.0	53.2	63.9	0.0	48.9
Incr Delay (d2), s/veh	5.6	9.1	0.0	5.8	0.0	0.0	7.3	0.0	19.8	20.1	0.0	0.2
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/lr	0.7	2.8	0.0	2.5	5.3	0.3	2.1	0.0	6.9	1.1	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.8	9.1	0.0	67.0	10.1	7.5	69.3	0.0	73.0	84.0	0.0	49.1
LnGrp LOS	E	A	A	E	B	A	E	A	E	F	A	D
Approach Vol, veh/h	2232			995			238			62		
Approach Delay, s/veh	9.5			14.2			72.1			64.9		
Approach LOS	A			B			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	1.2	86.4	9.9	23.5	6.1	91.5	6.8	26.6				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	16.0	50.5	16.0	30.0	11.0	55.5	16.0	32.0				
Max Q Clear Time (g_c+11), s	1.7	2.0	6.6	5.4	3.7	17.7	4.4	22.0				
Green Ext Time (p_c), s	0.0	21.3	0.0	0.1	0.0	4.1	0.0	0.5				
Intersection Summary												
HCM 6th Ctrl Delay	16.0											
HCM 6th LOS	B											

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↖		↗	
Traffic Vol, veh/h	2	2242	955	20	61	28
Future Vol, veh/h	2	2242	955	20	61	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	8	0	0	0
Mvmt Flow	2	2360	1005	21	64	29

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1026	0	-	0	2200 513
Stage 1	-	-	-	-	1016 -
Stage 2	-	-	-	-	1184 -
Critical Hdwy	4.1	-	-	-	6.8 6.9
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	2.2	-	-	-	3.5 3.3
Pot Cap-1 Maneuver	685	-	-	-	~ 39 512
Stage 1	-	-	-	-	315 -
Stage 2	-	-	-	-	257 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	685	-	-	-	~ 39 512
Mov Cap-2 Maneuver	-	-	-	-	147 -
Stage 1	-	-	-	-	314 -
Stage 2	-	-	-	-	257 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	41.1
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	685	-	-	-	190
HCM Lane V/C Ratio	0.003	-	-	-	0.493
HCM Control Delay (s)	10.3	-	-	-	41.1
HCM Lane LOS	B	-	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	2.4

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

HCM 6th Signalized Intersection Summary
5: Providence Drive & OR 99W

11/03/2021



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (veh/h)	2243	68	77	951	24	63
Future Volume (veh/h)	2243	68	77	951	24	63
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1870	1900	1781	1693	1870
Adj Flow Rate, veh/h	2386	72	82	1012	26	67
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	4	2	0	8	14	2
Cap, veh/h	2655	1203	106	2894	93	91
Arrive On Green	0.76	0.76	0.06	0.85	0.06	0.06
Sat Flow, veh/h	3589	1585	1810	3474	1612	1585
Grp Volume(v), veh/h	2386	72	82	1012	26	67
Grp Sat Flow(s),veh/h/ln	1749	1585	1810	1692	1612	1585
Q Serve(g_s), s	62.0	1.4	5.4	7.4	1.9	5.0
Cycle Q Clear(g_c), s	62.0	1.4	5.4	7.4	1.9	5.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2655	1203	106	2894	93	91
V/C Ratio(X)	0.90	0.06	0.78	0.35	0.28	0.73
Avail Cap(c_a), veh/h	2655	1203	300	2894	404	398
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.0	3.6	55.7	1.8	54.2	55.6
Incr Delay (d2), s/veh	5.4	0.1	11.5	0.1	1.6	10.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.8	0.4	2.7	1.0	0.8	2.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.3	3.7	67.3	1.9	55.8	66.5
LnGrp LOS	B	A	E	A	E	E
Approach Vol, veh/h	2458			1094	93	
Approach Delay, s/veh	16.0			6.8	63.5	
Approach LOS	B			A	E	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	11.5	97.1			108.6	11.4
Change Period (Y+Rc), s	4.5	6.0			6.0	4.5
Max Green Setting (Gmax), s	19.9	55.0			79.4	30.1
Max Q Clear Time (g_c+I1), s	7.4	64.0			9.4	7.0
Green Ext Time (p_c), s	0.1	0.0			8.4	0.2

Intersection Summary

HCM 6th Ctrl Delay	14.4
HCM 6th LOS	B

HCM 6th TWSC
6: Brutscher Street & Site Access

11/03/2021

Intersection						
Int Delay, s/veh	0.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	4	11	218	5	17	86
Future Vol, veh/h	4	11	218	5	17	86
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	12	237	5	18	93

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	369	240	0	0	242
Stage 1	240	-	-	-	-
Stage 2	129	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	631	799	-	-	1324
Stage 1	800	-	-	-	-
Stage 2	897	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	622	799	-	-	1324
Mov Cap-2 Maneuver	622	-	-	-	-
Stage 1	800	-	-	-	-
Stage 2	884	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	1.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	743	1324
HCM Lane V/C Ratio	-	-	0.022	0.014
HCM Control Delay (s)	-	-	10	7.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0

HCM 6th AWSC
 1: N Springbrook Road & Haworth Avenue/Driveway

11/17/2021

Intersection	
Intersection Delay, s/veh	59.9
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↗		↖	↗	
Traffic Vol, veh/h	111	67	233	126	91	78	142	351	18	61	376	67
Future Vol, veh/h	111	67	233	126	91	78	142	351	18	61	376	67
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	1	3	1	1	1	0	1	3	0	0	2	0
Mvmt Flow	116	70	243	131	95	81	148	366	19	64	392	70
Number of Lanes	0	1	1	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	2
HCM Control Delay	22.9	43.8	51.7	107.7
HCM LOS	C	E	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	62%	0%	43%	100%	0%
Vol Thru, %	0%	95%	38%	0%	31%	0%	85%
Vol Right, %	0%	5%	0%	100%	26%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	142	369	178	233	295	61	443
LT Vol	142	0	111	0	126	61	0
Through Vol	0	351	67	0	91	0	376
RT Vol	0	18	0	233	78	0	67
Lane Flow Rate	148	384	185	243	307	64	461
Geometry Grp	7	7	7	7	6	7	7
Degree of Util (X)	0.385	0.948	0.493	0.579	0.806	0.169	1.147
Departure Headway (Hd)	9.861	9.336	10.085	9.059	10.015	9.551	8.952
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	367	392	360	400	363	376	406
Service Time	7.561	7.036	7.785	6.759	8.015	7.31	6.711
HCM Lane V/C Ratio	0.403	0.98	0.514	0.608	0.846	0.17	1.135
HCM Control Delay	18.6	64.5	22.2	23.5	43.8	14.3	120.6
HCM Lane LOS	C	F	C	C	E	B	F
HCM 95th-tile Q	1.8	10.5	2.6	3.5	6.9	0.6	17.3

HCM 6th Signalized Intersection Summary

2: N Springbrook Road & OR 99W

11/17/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	109	1031	121	464	1522	259	354	229	286	362	211	147
Future Volume (veh/h)	109	1031	121	464	1522	259	354	229	286	362	211	147
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		0.99	1.00		0.99
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
Work Zone On Approach		No		No		No		No		No		No
Adj Sat Flow, veh/h/ln	1885	1870	1811	1841	1856	1900	1885	1870	1826	1870	1885	1900
Adj Flow Rate, veh/h	114	1074	0	483	1585	0	369	239	298	377	220	153
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	2	6	4	3	0	1	2	5	2	1	0
Cap, veh/h	138	1446		415	1593		426	411	336	433	420	355
Arrive On Green	0.08	0.41	0.00	0.12	0.45	0.00	0.12	0.22	0.22	0.13	0.22	0.22
Sat Flow, veh/h	1795	3554	1535	3401	3526	1610	3483	1870	1528	3456	1885	1591
Grp Volume(v), veh/h	114	1074	0	483	1585	0	369	239	298	377	220	153
Grp Sat Flow(s),veh/h/ln	1795	1777	1535	1700	1763	1610	1742	1870	1528	1728	1885	1591
Q Serve(g_s), s	8.2	33.7	0.0	16.0	58.7	0.0	13.6	15.0	24.8	14.0	13.4	10.8
Cycle Q Clear(g_c), s	8.2	33.7	0.0	16.0	58.7	0.0	13.6	15.0	24.8	14.0	13.4	10.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	138	1446		415	1593		426	411	336	433	420	355
V/C Ratio(X)	0.82	0.74		1.16	0.99		0.87	0.58	0.89	0.87	0.52	0.43
Avail Cap(c_a), veh/h	219	1446		415	1593		558	457	373	554	432	364
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(l)	1.00	1.00	0.00	0.27	0.27	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	59.6	33.0	0.0	57.5	35.8	0.0	56.5	45.7	49.5	56.2	44.8	43.8
Incr Delay (d2), s/veh	6.6	3.5	0.0	80.8	10.6	0.0	9.0	0.7	19.2	9.8	0.5	0.3
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	4.0	14.9	0.0	11.5	26.6	0.0	6.5	7.0	11.1	6.8	6.4	4.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.1	36.5	0.0	138.3	46.4	0.0	65.5	46.5	68.8	66.1	45.2	44.1
LnGrp LOS	E	D		F	D		E	D	E	E	D	D
Approach Vol, veh/h		1188	A		2068	A		906			750	
Approach Delay, s/veh		39.4			67.8			61.5			55.5	
Approach LOS		D			E			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	57.8	20.0	33.2	14.1	63.7	20.4	32.8				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	16.0	45.5	21.0	30.0	16.0	45.5	21.0	32.0				
Max Q Clear Time (g_c+11g), s	11.0	35.7	15.6	15.4	10.2	60.7	16.0	26.8				
Green Ext Time (p_c), s	0.0	3.7	0.4	1.0	0.1	0.0	0.4	0.8				

Intersection Summary

HCM 6th Ctrl Delay	57.9
HCM 6th LOS	E

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
 3: Brutscher Street & OR 99W

11/17/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	1227	121	270	1943	55	268	11	174	15	21	63
Future Volume (veh/h)	35	1227	121	270	1943	55	268	11	174	15	21	63
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.99	1.00		0.99
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
Work Zone On Approach		No		No		No		No		No		No
Adj Sat Flow, veh/h/ln	1811	1841	1900	1870	1841	1900	1870	1900	1885	1900	1826	1870
Adj Flow Rate, veh/h	36	1278	126	281	2024	57	279	11	181	16	22	66
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	6	4	0	2	4	0	2	0	1	0	5	2
Cap, veh/h	45	1879	860	218	2215	1015	218	19	306	24	37	110
Arrive On Green	0.05	1.00	1.00	0.12	0.63	0.63	0.12	0.20	0.20	0.01	0.09	0.09
Sat Flow, veh/h	1725	3497	1601	1781	3497	1603	1781	93	1523	1810	398	1194
Grp Volume(v), veh/h	36	1278	126	281	2024	57	279	0	192	16	0	88
Grp Sat Flow(s),veh/h/ln	1725	1749	1601	1781	1749	1603	1781	0	1615	1810	0	1592
Q Serve(g_s), s	2.7	0.0	0.0	16.0	66.0	1.8	16.0	0.0	14.1	1.2	0.0	7.0
Cycle Q Clear(g_c), s	2.7	0.0	0.0	16.0	66.0	1.8	16.0	0.0	14.1	1.2	0.0	7.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.94	1.00		0.75
Lane Grp Cap(c), veh/h	45	1879	860	218	2215	1015	218	0	325	24	0	147
V/C Ratio(X)	0.79	0.68	0.15	1.29	0.91	0.06	1.28	0.00	0.59	0.66	0.00	0.60
Avail Cap(c_a), veh/h	145	1879	860	218	2215	1015	218	0	395	221	0	365
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.51	0.51	0.51	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	61.7	0.0	0.0	57.5	20.9	9.1	57.5	0.0	47.4	64.3	0.0	57.1
Incr Delay (d2), s/veh	5.9	1.0	0.2	161.1	6.3	0.0	157.4	0.0	0.6	10.6	0.0	1.4
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	1.2	0.3	0.0	16.8	25.4	0.6	16.8	0.0	5.8	0.6	0.0	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.6	1.0	0.2	218.6	27.2	9.1	214.9	0.0	48.1	74.9	0.0	58.6
LnGrp LOS	E	A	A	F	C	A	F	A	D	E	A	E
Approach Vol, veh/h		1440			2362			471				104
Approach Delay, s/veh		2.6			49.5			146.9				61.1
Approach LOS		A			D			F				E
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	74.9	20.0	16.1	7.4	87.4	5.8	30.3				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	16.0	50.5	16.0	30.0	11.0	55.5	16.0	32.0				
Max Q Clear Time (g_c+11g), s	11.0	2.0	18.0	9.0	4.7	68.0	3.2	16.1				
Green Ext Time (p_c), s	0.0	8.0	0.0	0.3	0.0	0.0	0.0	0.7				

Intersection Summary

HCM 6th Ctrl Delay	44.8
HCM 6th LOS	D

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑↑	↑↑		↘	
Traffic Vol, veh/h	21	1357	2264	99	18	16
Future Vol, veh/h	21	1357	2264	99	18	16
Conflicting Peds, #/hr	2	0	0	2	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	5	4	4	1	6	0
Mvmt Flow	22	1399	2334	102	19	16

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	2438	0	-	0	3131 1220
Stage 1	-	-	-	-	2387 -
Stage 2	-	-	-	-	744 -
Critical Hdwy	4.2	-	-	-	6.92 6.9
Critical Hdwy Stg 1	-	-	-	-	5.92 -
Critical Hdwy Stg 2	-	-	-	-	5.92 -
Follow-up Hdwy	2.25	-	-	-	3.56 3.3
Pot Cap-1 Maneuver	181	-	-	-	~ 8 175
Stage 1	-	-	-	-	52 -
Stage 2	-	-	-	-	420 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	181	-	-	-	~ 7 175
Mov Cap-2 Maneuver	-	-	-	-	39 -
Stage 1	-	-	-	-	46 -
Stage 2	-	-	-	-	419 -







Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	124.6
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	181	-	-	-	61
HCM Lane V/C Ratio	0.12	-	-	-	0.575
HCM Control Delay (s)	27.6	-	-	-	124.6
HCM Lane LOS	D	-	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	2.4

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

HCM 6th Signalized Intersection Summary
5: Providence Drive & OR 99W

11/17/2021

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (veh/h)	1340	35	65	2247	122	110
Future Volume (veh/h)	1340	35	65	2247	122	110
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1856	1841	1870	1870	1900
Adj Flow Rate, veh/h	1396	36	68	2341	127	115
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	4	3	4	2	2	0
Cap, veh/h	2563	1151	88	2915	164	149
Arrive On Green	0.73	0.73	0.05	0.82	0.09	0.09
Sat Flow, veh/h	3589	1571	1753	3647	1781	1610
Grp Volume(v), veh/h	1396	36	68	2341	127	115
Grp Sat Flow(s),veh/h/ln	1749	1571	1753	1777	1781	1610
Q Serve(g_s), s	21.3	0.8	4.6	41.6	8.4	8.4
Cycle Q Clear(g_c), s	21.3	0.8	4.6	41.6	8.4	8.4
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2563	1151	88	2915	164	149
V/C Ratio(X)	0.54	0.03	0.78	0.80	0.77	0.77
Avail Cap(c_a), veh/h	2563	1151	291	2915	447	404
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.1	4.4	56.3	5.7	53.2	53.2
Incr Delay (d2), s/veh	0.8	0.1	13.5	1.7	7.5	8.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	0.2	2.3	9.0	4.1	3.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	8.0	4.4	69.9	7.4	60.7	61.6
LnGrp LOS	A	A	E	A	E	E
Approach Vol, veh/h	1432			2409	242	
Approach Delay, s/veh	7.9			9.2	61.1	
Approach LOS	A			A	E	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	10.5	93.9			104.4	15.6
Change Period (Y+Rc), s	4.5	6.0			6.0	4.5
Max Green Setting (Gmax), s	19.9	55.0			79.4	30.1
Max Q Clear Time (g_c+I1), s	6.6	23.3			43.6	10.4
Green Ext Time (p_c), s	0.1	12.3			26.6	0.7
Intersection Summary						
HCM 6th Ctrl Delay			11.8			
HCM 6th LOS			B			

HCM 6th TWSC
6: Brutscher Street & Site Access

11/17/2021

Intersection						
Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	11	12	441	11	13	399
Future Vol, veh/h	11	12	441	11	13	399
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	13	479	12	14	434

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	947	485	0	0	491
Stage 1	485	-	-	-	-
Stage 2	462	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	290	582	-	-	1072
Stage 1	619	-	-	-	-
Stage 2	634	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	285	582	-	-	1072
Mov Cap-2 Maneuver	285	-	-	-	-
Stage 1	619	-	-	-	-
Stage 2	623	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.9	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	388	1072
HCM Lane V/C Ratio	-	-	0.064	0.013
HCM Control Delay (s)	-	-	14.9	8.4
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0

2020 AM Peak Hour

Critical flow ratio = Adjusted flow rate / saturated flow rate calculations:

OR 99W at N Springbrook Street

	Adj flow rate	sat flow rate	crit flow ratio
EBT	1340	3497	0.3832
WBL	280	3291	0.0851
NBT	203	1811	0.1121
SBL	444	3428	0.1295

Sum = 0.70988046

Total lost time = L = 16.5

Cycle length = C = 131

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.812178**

OR 99W at Brutscher Street

	Adj flow rate	sat flow rate	crit flow ratio
EBT	2102	3497	0.6011
WBL	59	1682	0.0351
NBL	53	1626	0.0326
SBT	5	177	0.0282

Sum = 0.69700785

Total lost time = L = 16.5

Cycle length = C = 131

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.79745**

OR 99W at Providence Drive

	Adj flow rate	sat flow rate	crit flow ratio
EBT	2286	3589	0.6369
WBL	79	1810	0.0436
NBR	64	1585	0.0404

Sum = 0.72097118

Total lost time = L = 15

Cycle length = C = 120

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.823967**

2020 PM Peak Hour

Critical flow ratio = Adjusted flow rate / saturated flow rate calculations:

OR 99W at N Springbrook Street

	Adj flow rate	sat flow rate	crit flow ratio
EBL	109	1795	0.0607
WBT	1520	3526	0.4311
NBT	229	1870	0.1225
SBL	361	3456	0.1045

Sum = 0.71872353

Total lost time = L = 16.5

Cycle length = C = 131

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.822295**

OR 99W at Brutscher Street

	Adj flow rate	sat flow rate	crit flow ratio
EBL	34	1725	0.0197
WBT	1947	3497	0.5568
NBL	261	1781	0.1465
SBT	21	403	0.0521

Sum = 0.77512915

Total lost time = L = 16.5

Cycle length = C = 131

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.886829**

OR 99W at Providence Drive

	Adj flow rate	sat flow rate	crit flow ratio
EBT	1338	3589	0.3728
WBL	66	1753	0.0376
NBL	122	1781	0.0685

Sum = 0.47895638

Total lost time = L = 15

Cycle length = C = 120

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.547379**

2023 Background AM

Critical flow ratio = Adjusted flow rate / saturated flow rate calculations:

OR 99W at N Springbrook Street

	Adj flow rate	sat flow rate	crit flow ratio
EBT	1393	3497	0.3983
WBL	291	3291	0.0884
NBT	212	1811	0.1171
SBL	462	3428	0.1348

Sum = 0.73859927

Total lost time = L = 16.5

Cycle length = C = 131

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.845035**

OR 99W at Brutscher Street

	Adj flow rate	sat flow rate	crit flow ratio
EBT	2185	3497	0.6248
WBL	61	1682	0.0363
NBL	55	1626	0.0338
SBT	6	201	0.0299

Sum = 0.72476371

Total lost time = L = 16.5

Cycle length = C = 131

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.829206**

OR 99W at Providence Drive

	Adj flow rate	sat flow rate	crit flow ratio
EBT	2378	3589	0.6626
WBL	82	1810	0.0453
NBR	67	1585	0.0423

Sum = 0.75015527

Total lost time = L = 15

Cycle length = C = 120

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.85732**

2023 Background PM

Critical flow ratio = Adjusted flow rate / saturated flow rate calculations:

OR 99W at N Springbrook Street

	Adj flow rate	sat flow rate	crit flow ratio
EBL	114	1795	0.0635
WBT	1580	3526	0.4481
NBT	239	1870	0.1278
SBL	376	3456	0.1088

Sum = 0.74821336

Total lost time = L = 16.5

Cycle length = C = 131

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.856035**

OR 99W at Brutscher Street

	Adj flow rate	sat flow rate	crit flow ratio
EBL	36	1725	0.0209
WBT	2024	3497	0.5788
NBL	272	1781	0.1527
SBT	22	398	0.0553

Sum = 0.80765095

Total lost time = L = 16.5

Cycle length = C = 131

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.924037**

OR 99W at Providence Drive

	Adj flow rate	sat flow rate	crit flow ratio
EBT	1411	3589	0.3931
WBL	68	1753	0.0388
NBL	127	1781	0.0713

Sum = 0.50324462

Total lost time = L = 15

Cycle length = C = 120

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.575137**

2023 Buildout AM

Critical flow ratio = Adjusted flow rate / saturated flow rate calculations:

OR 99W at N Springbrook Street

	Adj flow rate	sat flow rate	crit flow ratio
EBT	1397	3497	0.3995
WBL	292	3291	0.0887
NBT	212	1811	0.1171
SBL	463	3428	0.1351

Sum = 0.74033868

Total lost time = L =

16.5

Cycle length = C =

131

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.847025**

OR 99W at Brutscher Street

	Adj flow rate	sat flow rate	crit flow ratio
EBT	2186	3497	0.6251
WBL	74	1682	0.0440
NBL	58	1626	0.0357
SBT	6	201	0.0299

Sum = 0.73462358

Total lost time = L =

16.5

Cycle length = C =

131

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.840486**

OR 99W at Providence Drive

	Adj flow rate	sat flow rate	crit flow ratio
EBT	2386	3589	0.6648
WBL	82	1810	0.0453
NBR	67	1585	0.0423

Sum = 0.7523843

Total lost time = L =

15

Cycle length = C =

120

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.859868**

2023 Buildout PM

Critical flow ratio = Adjusted flow rate / saturated flow rate calculations:

OR 99W at N Springbrook Street

	Adj flow rate	sat flow rate	crit flow ratio
EBL	114	1795	0.0635
WBT	1585	3526	0.4495
NBT	239	1870	0.1278
SBL	377	3456	0.1091

Sum = 0.74992075

Total lost time = L = 16.5

Cycle length = C = 131

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.857988**

OR 99W at Brutscher Street

	Adj flow rate	sat flow rate	crit flow ratio
EBL	36	1725	0.0209
WBT	2024	3497	0.5788
NBL	279	1781	0.1567
SBT	22	398	0.0553

Sum = 0.81158133

Total lost time = L = 16.5

Cycle length = C = 131

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.928534**

OR 99W at Providence Drive

	Adj flow rate	sat flow rate	crit flow ratio
EBT	1396	3589	0.3890
WBL	68	1753	0.0388
NBL	127	1781	0.0713

Sum = 0.49906518

Total lost time = L = 15

Cycle length = C = 120

Xc = Critical V/C Ratio = Sum of critical flow ratios * C/(C-L) = **0.57036**

Appendix F: Queueing Analysis

Queuing and Blocking Report
2023 Background Conditions

11/03/2021

Intersection: 1: N Springbrook Road & Haworth Avenue/Driveway

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	L	TR	L	TR
Maximum Queue (ft)	126	353	83	207	281	125	1474
Average Queue (ft)	49	177	35	48	103	37	1421
95th Queue (ft)	91	334	72	109	203	129	1539
Link Distance (ft)	865	865	433	445	445		1402
Upstream Blk Time (%)							95
Queuing Penalty (veh)							0
Storage Bay Dist (ft)						100	
Storage Blk Time (%)						0	99
Queuing Penalty (veh)						0	16

Intersection: 2: N Springbrook Road & OR 99W

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	L	T
Maximum Queue (ft)	374	2932	2906	375	194	216	291	309	75	130	214	1125
Average Queue (ft)	105	2240	2240	153	101	126	146	159	3	48	85	441
95th Queue (ft)	342	3580	3552	456	176	197	255	266	48	109	159	1006
Link Distance (ft)		3769	3769				1248	1248				1661
Upstream Blk Time (%)		7	7									0
Queuing Penalty (veh)		0	0									0
Storage Bay Dist (ft)	350			350	450	450			325	250	250	
Storage Blk Time (%)	0	60	64	0				0				1
Queuing Penalty (veh)	0	24	42	1				0				7

Intersection: 2: N Springbrook Road & OR 99W

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	L	T	R
Maximum Queue (ft)	275	127	140	463	137
Average Queue (ft)	250	120	135	447	23
95th Queue (ft)	320	140	148	493	85
Link Distance (ft)				445	
Upstream Blk Time (%)				33	
Queuing Penalty (veh)				207	
Storage Bay Dist (ft)	250	115	115		115
Storage Blk Time (%)	25	17	62	13	0
Queuing Penalty (veh)	90	37	133	64	0

Queuing and Blocking Report
2023 Background Conditions

11/03/2021

Intersection: 3: Brutscher Street & OR 99W

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	190	844	890	198	158	198	196	102	202	247	100	76
Average Queue (ft)	22	509	596	19	61	67	69	7	59	89	31	26
95th Queue (ft)	88	789	876	105	127	156	163	45	132	183	77	62
Link Distance (ft)		1248	1248			1312	1312			1394	541	541
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	230			175	350			125	230			
Storage Blk Time (%)	0	11	23	0			2	0	0	1		
Queuing Penalty (veh)	0	2	5	0			1	0	0	0		

Intersection: 4: OR 99W & Vittoria Way

Movement	EB	EB	EB	SB
Directions Served	L	T	T	LR
Maximum Queue (ft)	25	172	188	715
Average Queue (ft)	1	12	19	394
95th Queue (ft)	11	84	100	751
Link Distance (ft)	1312	1312	1312	1160
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Providence Drive & OR 99W

Movement	EB	EB	EB	WB	WB	WB	NB	NB
Directions Served	T	T	R	L	T	T	L	R
Maximum Queue (ft)	423	427	115	131	148	127	82	132
Average Queue (ft)	230	254	21	67	49	43	27	58
95th Queue (ft)	420	448	86	120	113	102	66	115
Link Distance (ft)	420	420			2426	2426		1466
Upstream Blk Time (%)	0	1						
Queuing Penalty (veh)	3	8						
Storage Bay Dist (ft)			100	400			175	
Storage Blk Time (%)		16	0					0
Queuing Penalty (veh)		11	0					0

Network Summary

Network wide Queuing Penalty: 654

Queuing and Blocking Report
2023 Background Conditions

11/03/2021

Intersection: 1: N Springbrook Road & Haworth Avenue/Driveway

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	L	TR	L	TR
Maximum Queue (ft)	190	389	448	308	423	125	1442
Average Queue (ft)	71	154	302	87	219	90	1368
95th Queue (ft)	137	330	534	236	411	181	1657
Link Distance (ft)	865	865	433	445	445		1402
Upstream Blk Time (%)			28		4		85
Queuing Penalty (veh)			0		10		0
Storage Bay Dist (ft)						100	
Storage Blk Time (%)						0	99
Queuing Penalty (veh)						1	61

Intersection: 2: N Springbrook Road & OR 99W

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	L	T
Maximum Queue (ft)	374	556	609	375	359	475	1220	1267	350	259	275	1214
Average Queue (ft)	138	340	371	94	204	342	702	739	207	150	189	504
95th Queue (ft)	323	516	552	362	340	571	1252	1304	488	252	294	1374
Link Distance (ft)		3769	3769				1248	1248				1661
Upstream Blk Time (%)							0	1				4
Queuing Penalty (veh)							5	8				0
Storage Bay Dist (ft)	350			350	450	450			325	250	250	
Storage Blk Time (%)	0	8	12	0	0	1	20	34	0	1	2	11
Queuing Penalty (veh)	0	8	14	1	1	5	93	87	3	3	11	72

Intersection: 2: N Springbrook Road & OR 99W

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	L	T	R
Maximum Queue (ft)	275	127	140	462	140
Average Queue (ft)	190	117	135	406	70
95th Queue (ft)	319	146	150	534	154
Link Distance (ft)				445	
Upstream Blk Time (%)				13	
Queuing Penalty (veh)				94	
Storage Bay Dist (ft)	250	115	115		115
Storage Blk Time (%)	5	12	46	20	2
Queuing Penalty (veh)	32	45	164	102	9

Queuing and Blocking Report
2023 Background Conditions

11/03/2021

Intersection: 3: Brutscher Street & OR 99W

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	234	567	675	200	375	1342	1349	137	255	1441	68	173
Average Queue (ft)	60	379	469	95	345	1148	1144	32	253	1304	16	66
95th Queue (ft)	177	555	646	237	441	1589	1586	122	262	1733	49	137
Link Distance (ft)		1248	1248			1312	1312			1394	541	541
Upstream Blk Time (%)						5	5			69		
Queuing Penalty (veh)						60	51			0		
Storage Bay Dist (ft)	230			175	350			125	230			
Storage Blk Time (%)	0	18	39	0	28	19	32	0	83	0		
Queuing Penalty (veh)	0	6	45	1	276	50	17	0	149	1		

Intersection: 4: OR 99W & Vittoria Way

Movement	EB	EB	EB	WB	WB	SB
Directions Served	L	T	T	T	TR	LR
Maximum Queue (ft)	70	77	98	440	442	331
Average Queue (ft)	21	4	8	225	220	169
95th Queue (ft)	55	40	56	520	521	378
Link Distance (ft)	1312	1312	1312	420	420	1160
Upstream Blk Time (%)				3	3	
Queuing Penalty (veh)				31	31	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Providence Drive & OR 99W

Movement	EB	EB	EB	WB	WB	WB	NB	NB
Directions Served	T	T	R	L	T	T	L	R
Maximum Queue (ft)	425	427	124	424	2071	2075	190	208
Average Queue (ft)	169	181	14	143	1130	1119	114	99
95th Queue (ft)	379	395	67	394	2648	2617	187	186
Link Distance (ft)	420	420			2426	2426		1466
Upstream Blk Time (%)	0	0			13	10		
Queuing Penalty (veh)	2	2			0	0		
Storage Bay Dist (ft)			100	400			175	
Storage Blk Time (%)		13	0	0	23		2	1
Queuing Penalty (veh)		4	0	0	15		2	1

Network Summary

Network wide Queuing Penalty: 1574

Intersection: 1: N Springbrook Road & Haworth Avenue/Driveway

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	L	TR	L	TR
Maximum Queue (ft)	137	459	81	118	242	125	1471
Average Queue (ft)	51	186	34	47	97	36	1405
95th Queue (ft)	115	401	64	90	185	129	1587
Link Distance (ft)	865	865	433	445	445		1402
Upstream Blk Time (%)							93
Queuing Penalty (veh)							0
Storage Bay Dist (ft)						100	
Storage Blk Time (%)						0	100
Queuing Penalty (veh)						0	16

Intersection: 2: N Springbrook Road & OR 99W

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	L	L	T	R
Maximum Queue (ft)	375	2818	2808	375	210	240	300	310	145	217	873	275
Average Queue (ft)	111	2182	2185	151	105	127	136	151	52	86	346	237
95th Queue (ft)	356	3512	3491	454	185	203	240	255	118	169	756	325
Link Distance (ft)		3769	3769				1248	1248				1661
Upstream Blk Time (%)		7	6									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	350			350	450	450			250	250		250
Storage Blk Time (%)	0	60	63	0				0			1	20
Queuing Penalty (veh)	0	24	42	1				0			6	73

Intersection: 2: N Springbrook Road & OR 99W

Movement	SB	SB	SB	SB
Directions Served	L	L	T	R
Maximum Queue (ft)	127	140	464	122
Average Queue (ft)	121	136	448	20
95th Queue (ft)	138	148	488	68
Link Distance (ft)			445	
Upstream Blk Time (%)			32	
Queuing Penalty (veh)			203	
Storage Bay Dist (ft)	115	115		115
Storage Blk Time (%)	21	65	8	0
Queuing Penalty (veh)	45	139	41	0

Queuing and Blocking Report
2023 Buildout Conditions

11/03/2021

Intersection: 3: Brutscher Street & OR 99W

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	200	831	949	200	166	203	214	89	129	246	122	98
Average Queue (ft)	31	545	632	22	74	63	75	9	58	93	34	26
95th Queue (ft)	114	844	918	113	140	150	165	50	118	182	90	66
Link Distance (ft)		1248	1248			1312	1312			578	541	541
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	230			175	350			125	230			
Storage Blk Time (%)	0	13	24	0			2	0		1		
Queuing Penalty (veh)	0	3	6	1			0	0		0		

Intersection: 4: OR 99W & Vittoria Way

Movement	EB	EB	EB	SB
Directions Served	L	T	T	LR
Maximum Queue (ft)	26	90	125	808
Average Queue (ft)	1	7	11	463
95th Queue (ft)	12	54	72	1003
Link Distance (ft)	1312	1312	1312	1160
Upstream Blk Time (%)				3
Queuing Penalty (veh)				0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Providence Drive & OR 99W

Movement	EB	EB	EB	WB	WB	WB	NB	NB
Directions Served	T	T	R	L	T	T	L	R
Maximum Queue (ft)	398	408	125	164	141	138	104	140
Average Queue (ft)	201	227	24	64	52	46	26	57
95th Queue (ft)	378	410	93	127	117	107	73	118
Link Distance (ft)	420	420			2426	2426		1466
Upstream Blk Time (%)	0	0						
Queuing Penalty (veh)	2	3						
Storage Bay Dist (ft)			100	400			175	
Storage Blk Time (%)		14	0				0	0
Queuing Penalty (veh)		9	0				0	0

Intersection: 6: Brutscher Street & Site Access

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	46	64
Average Queue (ft)	13	5
95th Queue (ft)	41	31
Link Distance (ft)	663	578
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 616

Intersection: 1: N Springbrook Road & Haworth Avenue/Driveway

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	LT	R	LTR	L	TR	L	TR
Maximum Queue (ft)	282	464	436	177	363	125	1458
Average Queue (ft)	87	273	321	65	186	79	1411
95th Queue (ft)	240	609	534	134	326	177	1543
Link Distance (ft)	865	865	433	445	445		1402
Upstream Blk Time (%)	0	1	29		0		96
Queuing Penalty (veh)	0	0	0		0		0
Storage Bay Dist (ft)						100	
Storage Blk Time (%)						0	100
Queuing Penalty (veh)						1	61

Intersection: 2: N Springbrook Road & OR 99W

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	L	T
Maximum Queue (ft)	346	585	618	375	336	475	995	1028	350	253	273	1224
Average Queue (ft)	122	338	369	83	191	255	429	455	156	153	190	423
95th Queue (ft)	294	520	556	338	299	465	802	844	440	250	291	1176
Link Distance (ft)		3769	3769				1249	1249				1661
Upstream Blk Time (%)							0	0				3
Queuing Penalty (veh)							0	0				0
Storage Bay Dist (ft)	350			350	450	450			325	250	250	
Storage Blk Time (%)	0	7	11	0		0	7	19	0	0	2	11
Queuing Penalty (veh)	0	8	13	1		0	33	51	2	2	8	68

Intersection: 2: N Springbrook Road & OR 99W

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	L	T	R
Maximum Queue (ft)	275	127	140	464	140
Average Queue (ft)	184	115	134	435	65
95th Queue (ft)	309	149	155	513	152
Link Distance (ft)				445	
Upstream Blk Time (%)				19	
Queuing Penalty (veh)				141	
Storage Bay Dist (ft)	250	115	115		115
Storage Blk Time (%)	4	8	48	21	2
Queuing Penalty (veh)	22	28	173	108	11

Queuing and Blocking Report
2023 Buildout Conditions

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Intersection: 3: Brutscher Street & OR 99W

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	TR
Maximum Queue (ft)	213	693	750	200	375	1344	1353	150	255	673	60	145
Average Queue (ft)	42	366	464	100	370	1240	1235	22	250	590	16	61
95th Queue (ft)	120	581	677	244	395	1544	1536	95	277	878	44	119
Link Distance (ft)		1249	1249			1312	1312			660	541	541
Upstream Blk Time (%)						11	10			50		
Queuing Penalty (veh)						121	108			227		
Storage Bay Dist (ft)	230			175	350			125	230			
Storage Blk Time (%)		17	39	0	56	7	21	0	74	2		
Queuing Penalty (veh)		6	47	1	539	19	11	0	138	4		

Intersection: 4: OR 99W & Vittoria Way

Movement	EB	EB	EB	WB	WB	SB
Directions Served	L	T	T	T	TR	LR
Maximum Queue (ft)	76	68	116	459	456	436
Average Queue (ft)	25	3	7	299	301	240
95th Queue (ft)	64	32	51	571	571	501
Link Distance (ft)	1312	1312	1312	420	420	1160
Upstream Blk Time (%)				7	6	
Queuing Penalty (veh)				78	74	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Providence Drive & OR 99W

Movement	EB	EB	EB	WB	WB	WB	NB	NB
Directions Served	T	T	R	L	T	T	L	R
Maximum Queue (ft)	422	425	125	425	2305	2297	197	252
Average Queue (ft)	175	194	15	195	1674	1673	109	101
95th Queue (ft)	366	395	72	490	3108	3100	187	190
Link Distance (ft)	420	420			2426	2426		1466
Upstream Blk Time (%)	0	0			32	27		
Queuing Penalty (veh)	1	2			0	0		
Storage Bay Dist (ft)			100	400			175	
Storage Blk Time (%)		13	0	0	38		3	1
Queuing Penalty (veh)		5	0	0	25		3	1

Intersection: 6: Brutscher Street & Site Access

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	234	667	117
Average Queue (ft)	92	521	7
95th Queue (ft)	246	998	53
Link Distance (ft)	630	679	660
Upstream Blk Time (%)		59	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 2142
