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Milwaukie Cottage Development

Transportation Impact
Study

Milwaukie, Oregon

Date:

September 4, 2023

Prepared for:

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RENEWS: 06/30/24

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Executive Summary

1. The proposed development will include the construction of a 41-unit cottage cluster development located at 9815/9833 SE 17th Avenue in Milwaukie, Oregon.
2. The trip generation calculations show that the proposed cottage cluster development is expected to generate an increase of 19 trips during the morning peak hour, 22 trips during the evening peak hour, and 286 trips during an average weekday.
3. Based on a review of the most recent five years of available crash data, all study intersections have calculated crash rates below the 90th percentile crash rate thresholds for similar intersection configurations within urban areas. No significant trends or crash patterns were identified at any of the study intersections, and no safety mitigation is recommended per the crash data analysis.
4. Adequate sight distances are available at the proposed site access intersection along SE McBrod Avenue. No sight distance mitigation is necessary or recommended.
5. MMC 12.16.040.C.4(b) requires a minimum distance of 100 feet from the nearest intersecting street face of curb to the nearest edge of driveway apron shall be maintained. Based on the most recent site plan, the proposed driveway access meets the minimum standard.
6. Left-turn lane warrants are not projected to be met under any of the analysis scenarios.
7. Due to insufficient traffic volumes, traffic signal warrants are not projected to be met at any of the unsignalized study intersections under any of the analysis scenarios.
8. The intersection of SE McBrod Avenue at SE 17th Avenue is currently operating above City of Milwaukie operational standards due to delays from westbound left-turning vehicles. However, the v/c ratios are low indicating the intersection can easily accommodate the additional project traffic demand. The proposed development is expected to generate 1 westbound trip during the morning peak period and 2 westbound trips during the evening peak period. There are no planned projects in the Milwaukie TSP related to improving the capacity at the intersection. Therefore, no operational mitigation is necessary or recommended at the intersection.
9. All other study intersections are currently operating acceptably per City of Milwaukie and ODOT standards and are projected to continue operating acceptably through the 2024 site buildout year. No operational mitigation is necessary or recommended at these intersections.
10. In general, changes in 95th percentile queuing between the year 2024 background and buildout conditions are anticipated to be small, one vehicle or two vehicles.

Project Description

Introduction

The proposed development will include the construction of a 41-unit cottage cluster development located at 9815/9833 SE 17th Avenue in Milwaukie, Oregon. This report addresses the impact of the project on the nearby street system. Based on correspondence with City of Milwaukie and Oregon Department of Transportation (ODOT) staff, the report conducts safety and operational analyses at the following study intersections:

1. Site Access at SE McBrod Avenue
2. SE McBrod Avenue at SE 17th Avenue
3. OR-224 at SE 17th Avenue
4. OR-99E at SE 17th Avenue

The purpose of this study is to provide an analysis of potential traffic impacts of the proposed development on the surrounding transportation system and to recommend any required mitigative measures. Detailed information on traffic counts, trip generation calculations, safety analyses, and level of service calculations are included in the appendices to this report.

Location Description

The project site is located west of SE 17th Avenue, north of SE McBrod Avenue, and south of SE Waverly Drive in Milwaukie, Oregon, and consists of three tax lots (lots 1000, 1200, and 1201). The site encompasses an approximate total of 2.61 acres and is currently developed with one single-family home and ancillary structures, all of which will be removed upon redevelopment of the site. The site is zoned Moderate Density Residential (R-MD) according to the City of Milwaukie zoning.

Figure 1 presents an aerial image of the nearby vicinity with the subject site outlined in yellow. A site plan is included in Appendix A.



Figure 1: Project Location (image from Google Earth)

Vicinity Roadways

The proposed development is expected to impact four roadways near the site. Table 1 provides a description of each of the vicinity roadways.

Table 1: Vicinity Roadway Descriptions

Street Name	Jurisdiction	Functional Classification	Cross-Section	Speed (MPH)	Curbs & Sidewalks	On-Street Parking	Bicycle Facilities
OR-224	ODOT	District Highway	3-7 Lanes	50 (Posted)	Partial Both Sides	Not Permitted	None
OR-99E	ODOT	District Highway	4-7 Lanes	30 (Posted)	Partial Both Sides	Not Permitted	None
SE 17 th Avenue	City of Milwaukie	Arterial	2-4 Lanes	35 (Posted)	Partial Both Sides	Not Permitted	East Side
SE McBrod Avenue	City of Milwaukie	Local	2 Lanes	20 (Posted)	Partial Both Sides	Partially Permitted	None

Table Notes: Functional Classification based on the Milwaukie Transportation System Plan (2013)

Study Intersections

Based on coordination with City of Milwaukie and ODOT staff, four intersections were identified for analysis. A summarized description of the study intersections is provided in Table 2.











Table 2: Study Intersection Descriptions

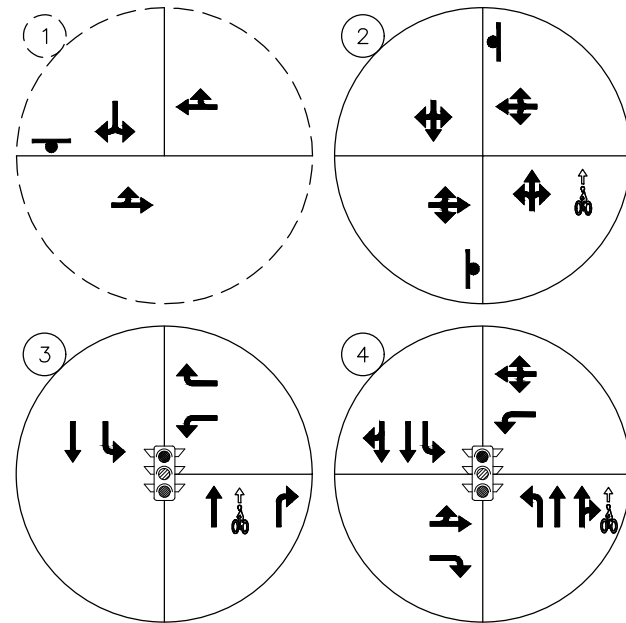
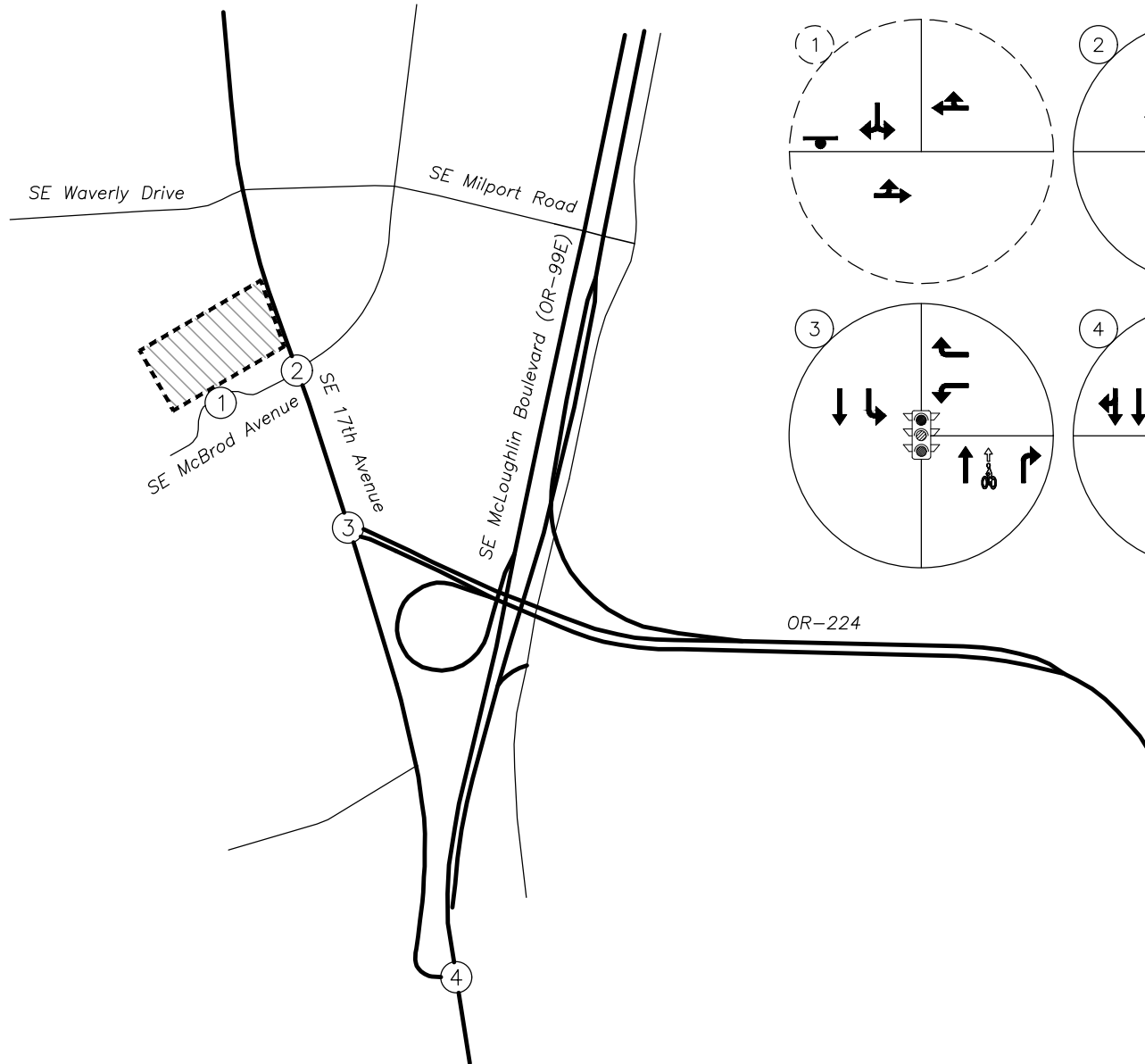
	Intersection	Geometry	Traffic Control	Phasing/Stopped Approaches
1	Site Access at SE McBrod Avenue (proposed)	Three-Legged	Stop Sign	SB Stop-Controlled
2	SE McBrod Avenue at SE 17 th Avenue	Four-Legged	Stop Sign	EB/WB Stop-Controlled
3	OR-224 at SE 17 th Avenue	Three-Legged	Traffic Signal	WB/SB Protected Left-Turns
4	OR-99E at SE 17 th Avenue	Four-Legged	Traffic Signal	NB/SB/EB/WB Protected Left-Turns

A vicinity map showing the project site, vicinity streets, and study intersection configurations is shown in Figure 2.



LEGEND

-  STUDY INTERSECTION (EXISTING)
-  STUDY INTERSECTION (PROPOSED)
-  STOP SIGN
-  TRAFFIC SIGNAL
-  BIKE LANE
-  PROJECT SITE
-  MINOR ARTERIAL
-  LOCAL STREET



no scale

Site Trips

Trip Generation

To determine the anticipated increase in trip generation due to the proposed development, the existing site trip generation as well as the proposed trip generation was evaluated. The site currently has a single-family dwelling located on it, which will be removed upon redevelopment of the site.

To estimate the number of trips that will be generated by the existing single-family dwelling unit and from the proposed 41-unit cottage cluster development, trip rates from the *Trip Generation Manual*¹ were used. Data from land use code 210, *Single-Family Detached Housing*, was used to estimate trip generation of the existing dwelling based on the number of units. Data from land use code 215, *Single-Family Attached Housing*, was used to estimate trip generation of the proposed cottage cluster development based on the number of dwelling units.

The trip generation calculations show that the proposed cottage cluster development is expected to generate an increase of 19 trips during the morning peak hour, 22 trips during the evening peak hour, and 286 trips during an average weekday. The trip generation calculations are summarized in Table 3. Detailed trip generation calculations are included in Appendix A.

Table 3: Trip Generation Summary

ITE Code	Intensity	Morning Peak Hour			Evening Peak Hour			Daily Trips
		In	Out	Total	In	Out	Total	
Existing								
210 – Single-Family Detached Housing	1 unit	0	1	1	1	0	1	10
Proposed Development								
215 – Single-Family Attached Housing	41 units	5	15	20	14	9	23	296
Net Increase in Site Trips		5	14	19	13	9	22	286

Trip Distribution

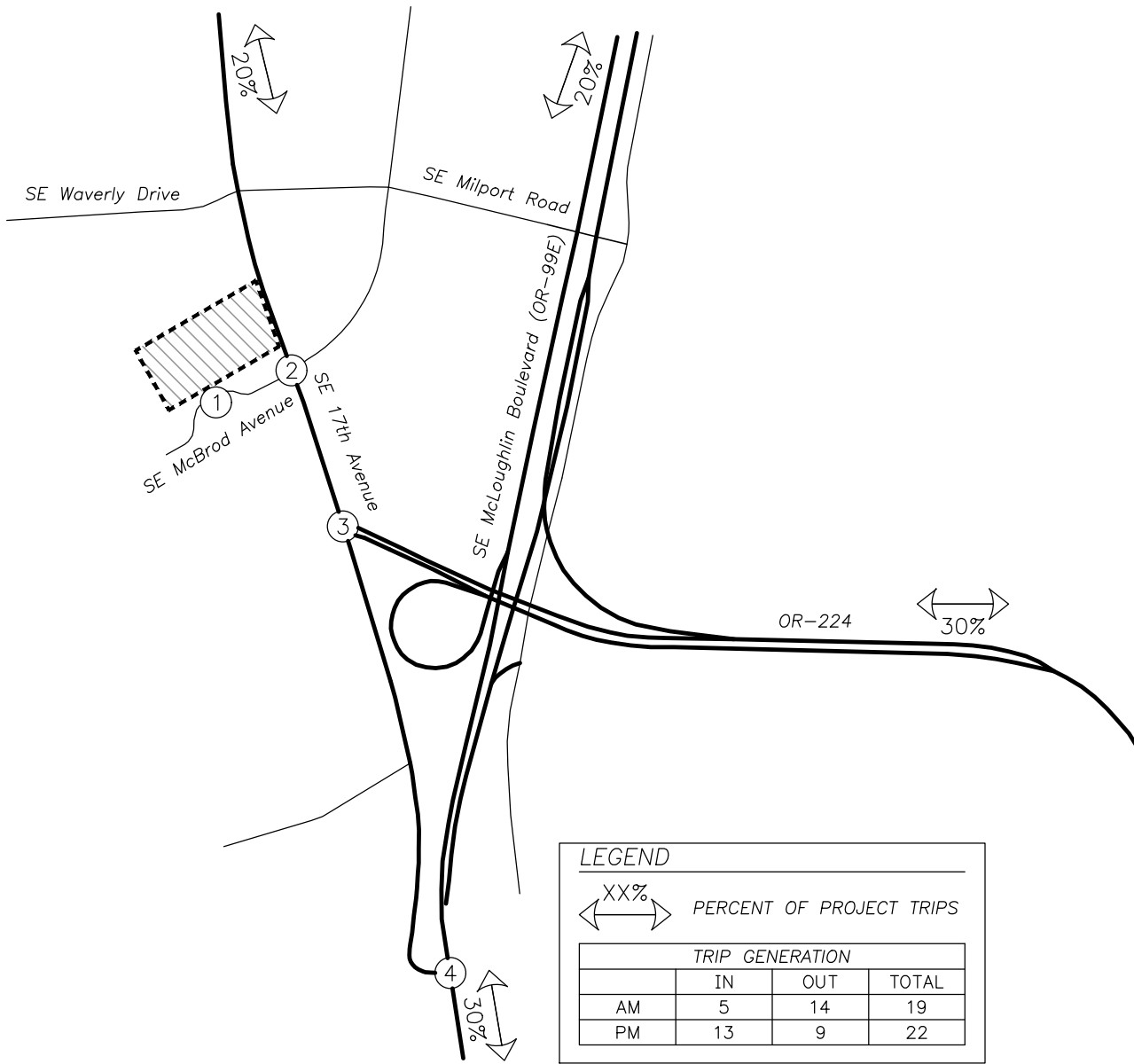
A preliminary directional distribution of the site trips to and from the proposed development was estimated based on locations of likely destinations and locations of major transportation facilities in the site vicinity. The following trip distribution was estimated and used for analysis:

- 60 percent of site trips will travel to/from the south on SE 17th Avenue:
 - 30 percent to/from the east along OR-224
 - 30 percent to/from the south along SE McLoughlin Boulevard (OR-99E)

¹ Institute of Transportation Engineers, *Trip Generation Manual*, 11th Edition, 2021.

- 20 percent of site trips will travel to/from the north on SE 17th Avenue
- 20 percent of site trips will travel to/from the north along SE McLoughlin Boulevard (OR-99E) via SE McBrod Avenue and SE Milport Road

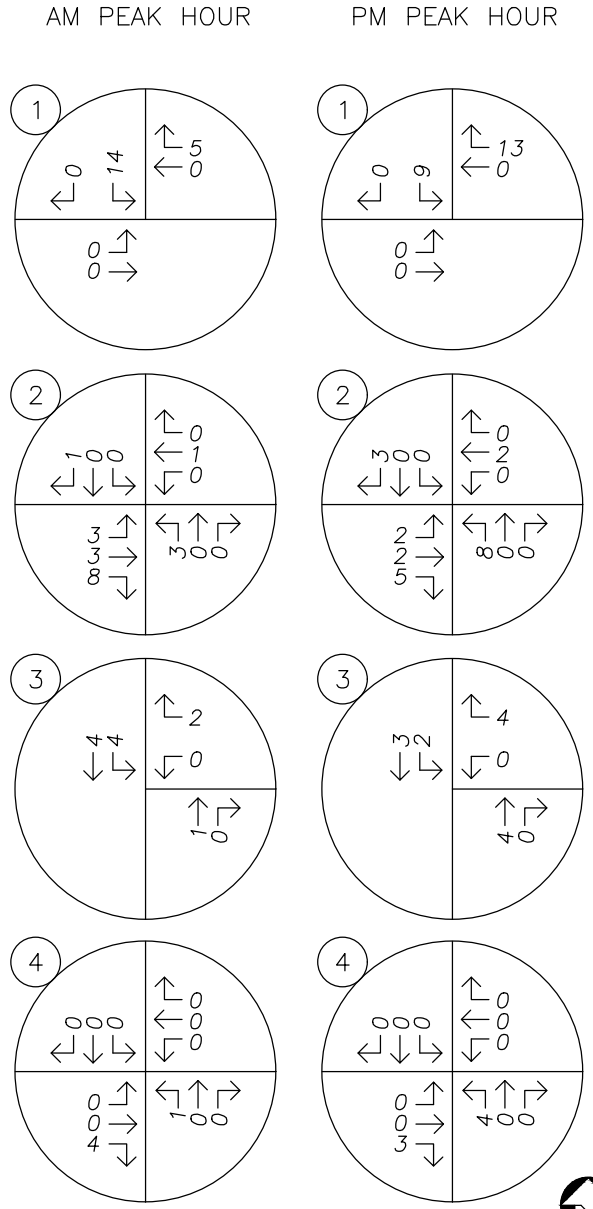
The trip distribution and assignment for the total site trips generated during the morning and evening peak hours is shown in Figure 3.



LEGEND

XX% PERCENT OF PROJECT TRIPS

TRIP GENERATION			
	IN	OUT	TOTAL
AM	5	14	19
PM	13	9	22



Traffic Volumes

Existing Conditions

Traffic counts were collected at the study intersections on Tuesday, February 7th, 2023, at the following times:

- SE McBrod Avenue at SE 17th Avenue – from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM
- OR-224 at SE 17th Avenue, OR-99E at SE 17th Avenue - from 6:00 AM to 9:00 AM and from 3:00 PM to 6:00 PM, given that the intersections are located along ODOT roadways.

Data was used from each intersection's respective morning and evening peak hours. Raw count data is included in Appendix B.

Since OR-224 and OR-99E are under the jurisdiction of ODOT, procedures described in ODOT's *Analysis Procedures Manual*² were used to seasonally adjust existing traffic volumes to reflect the 30th highest hour in a typical year. Using a map of seasonal trends, both OR-224 and OR-99E were determined to show a commuter trend, and a seasonal adjustment factor (SAF) of 1.2085 was applied to volumes along these roadways.

Figure 4 shows the existing seasonally-adjusted traffic volumes at the study intersections during the morning and evening peak hours.

Background Conditions

To provide analysis of the impact of the proposed land use, an estimate of future traffic volumes is required. A growth rate must be applied to recorded traffic volumes to calculate future volumes. The proposed development is anticipated to be complete in 2024.

Growth rates for through traffic on OR-99E were derived using ODOT's 2041 Future Volume Table. Site ID 169 was used for the intersection of OR-99E at SE 17th Avenue. A growth rate of 1.0 percent was applied to OR-99E through volumes over a one-year period to determine year 2024 background volumes.

For non-ODOT facilities, a compounded growth rate of two percent per year was applied to the existing traffic volumes over a one-year period to determine year 2024 background volumes. This two percent per year compounded growth rate is a common and conservative growth rate used for roadways that are not under the jurisdiction of ODOT. Although under the jurisdiction of ODOT, the intersection of OR-224 at SE 17th Avenue does not have any through volumes along OR-224; therefore, the compounded growth rate of two percent per year was applied to all turning movements at the intersection.

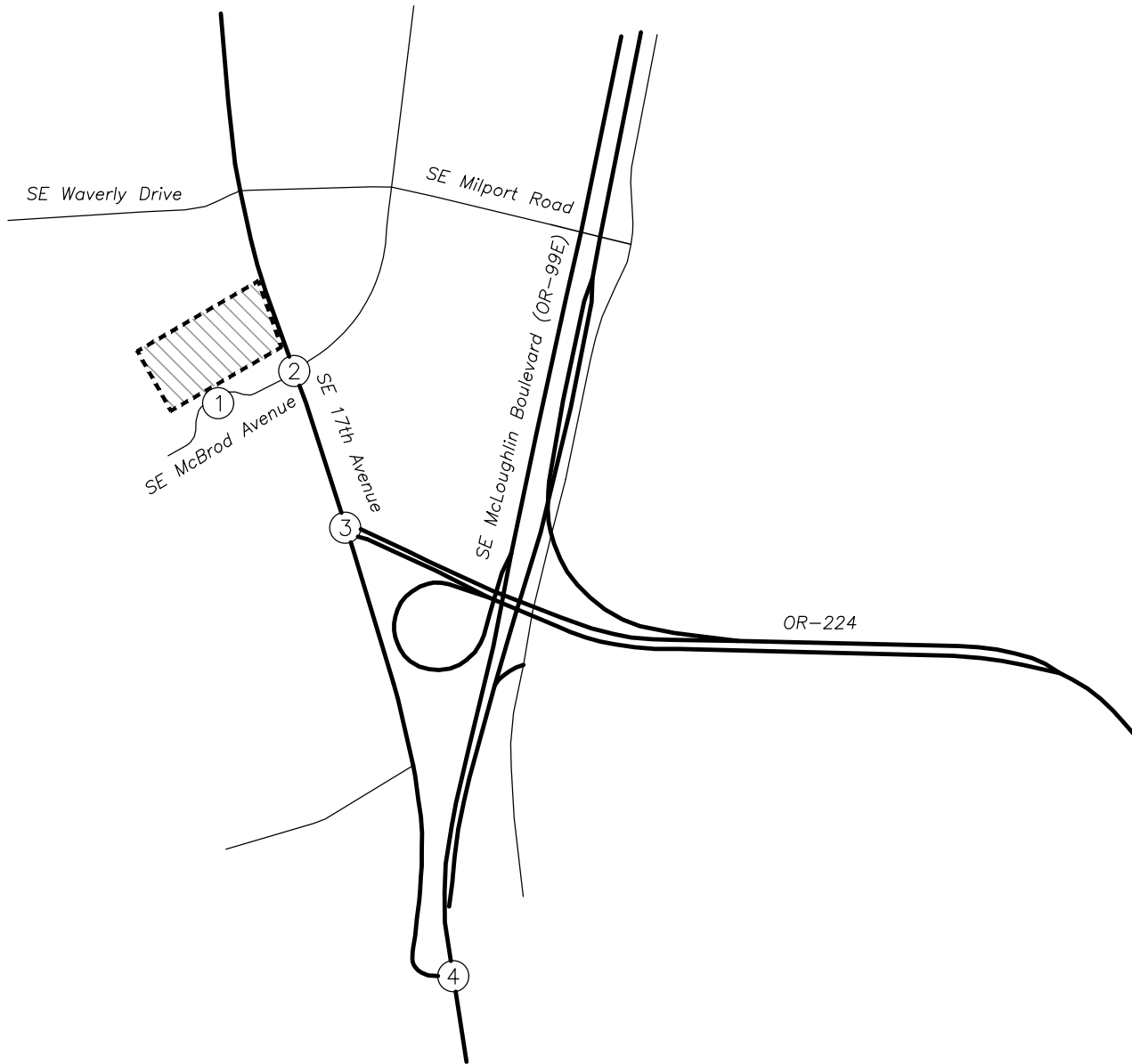
Figure 5 shows the projected year 2024 background traffic volumes at the study intersections during the morning and evening peak hours.

² ODOT, *Analysis Procedures Manual* Version 2, October 2020.

Buildout Conditions

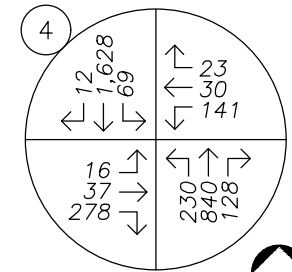
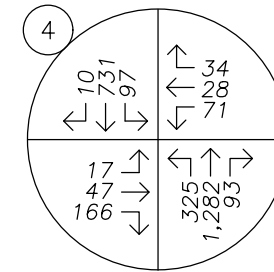
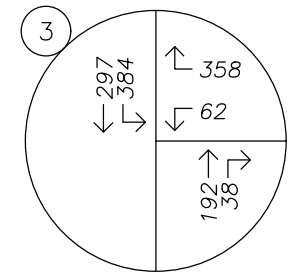
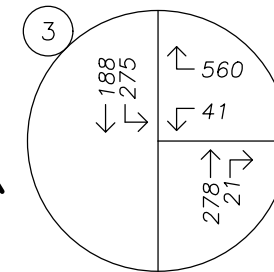
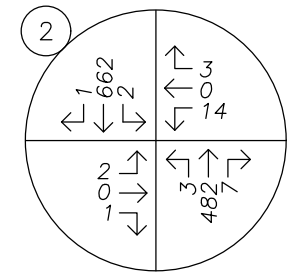
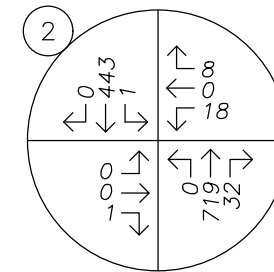
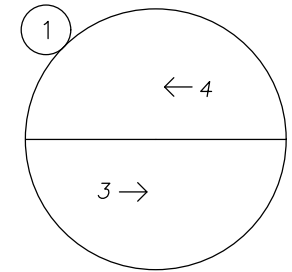
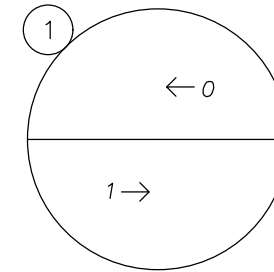
Peak hour trips calculated to be generated by the proposed development, as described earlier within the *Site Trips* section, were added to the projected year 2024 background traffic volumes to obtain the expected 2024 site buildout volumes with the completion of the development.

Figure 6 shows year 2024 buildout traffic volumes at the study intersections during the morning and evening peak hours.

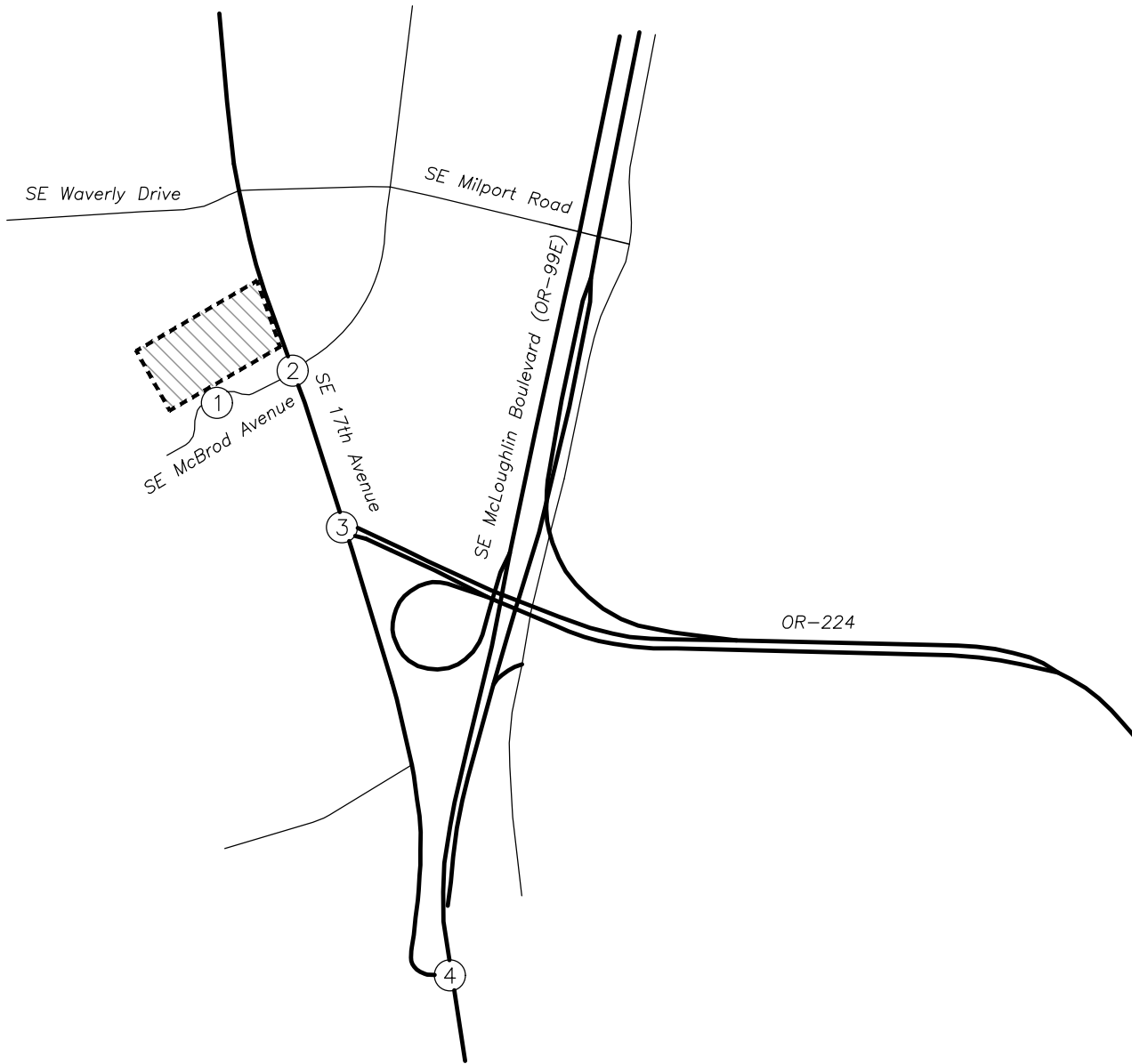


AM PEAK HOUR

PM PEAK HOUR

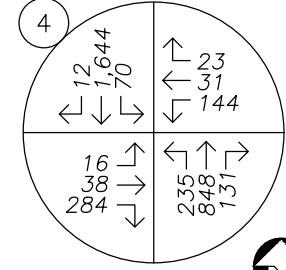
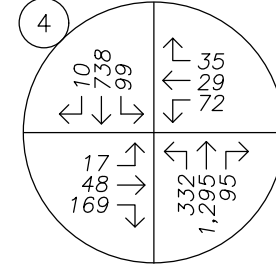
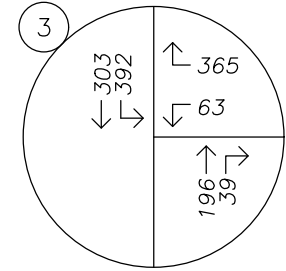
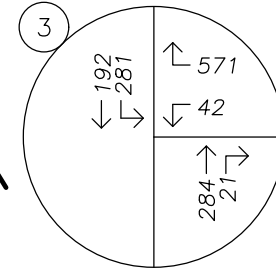
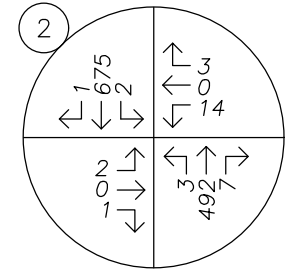
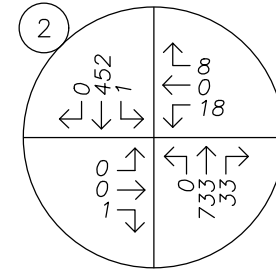
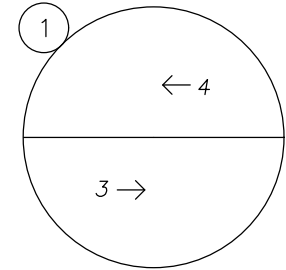
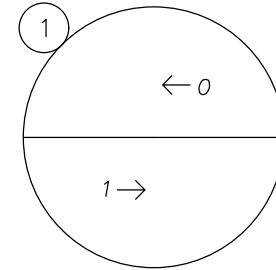


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AM PEAK HOUR

PM PEAK HOUR

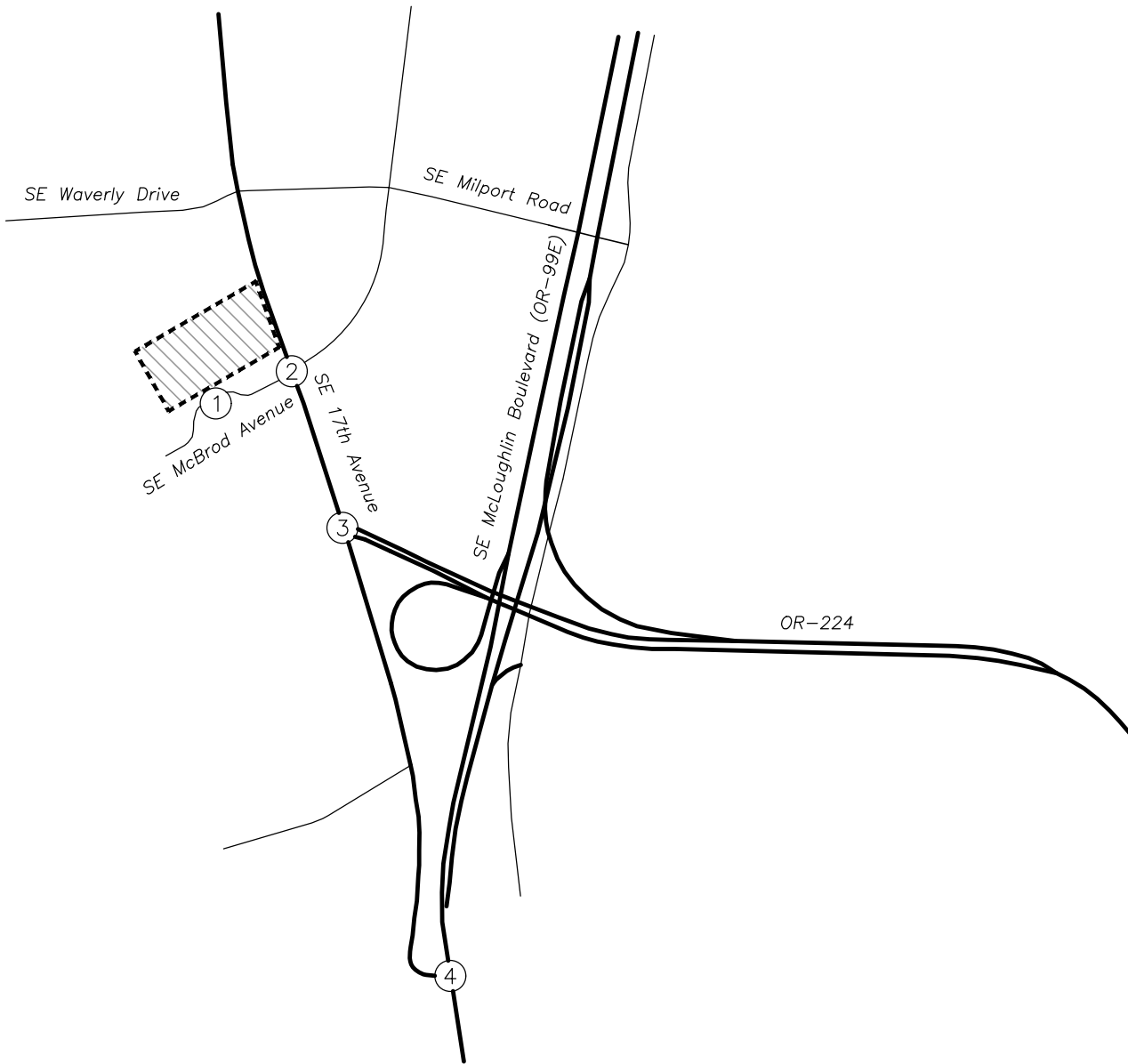


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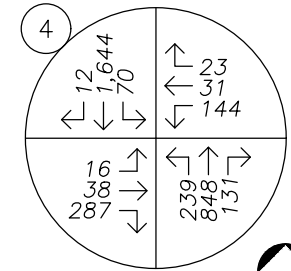
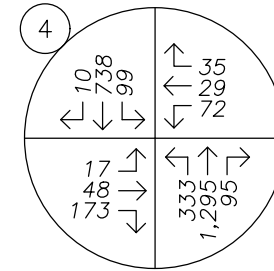
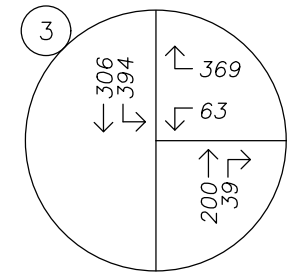
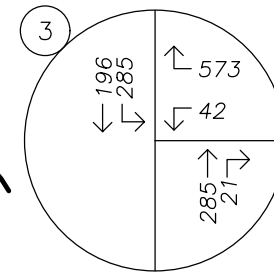
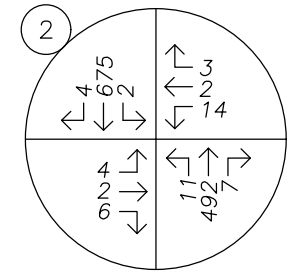
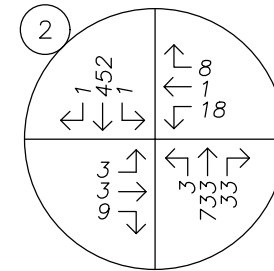
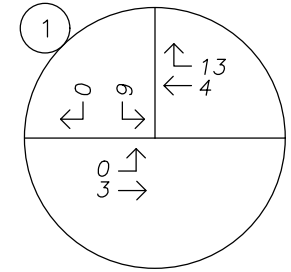
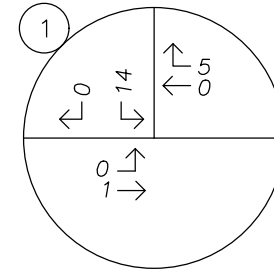
TRAFFIC VOLUMES
Year 2024 Background Conditions
AM & PM Peak Hours

Figure 5
Milwaukie Cottage Development
2/20/2023



AM PEAK HOUR

PM PEAK HOUR



no scale



TRAFFIC VOLUMES
Year 2024 Buildout Conditions
AM & PM Peak Hours

Figure 6
Milwaukie Cottage Development
2/20/2023

Safety Analysis

Crash History Review

Using data obtained from ODOT's Crash Data System, a review of approximately five years of the most recent available crash history (January 2016 through December 2020) was performed at the study intersections. The crash data was evaluated based on the number of crashes, the type of collisions, and the severity of the collisions. Crash severity is based on injuries sustained by people involved in the crash, and includes five categories:

- Property Damage Only (PDO)
- Possible Injury (Injury C)
- Non-Incapacitating Injury (Injury B)
- Incapacitating Injury (Injury A)
- Fatality or Fatal Injury

Crash rates provide the ability to compare safety risks at different intersections by accounting for both the number of crashes that have occurred during the study period and the number of vehicles that typically travel through the intersection. Crash rates were calculated using the common assumption that traffic counted during the evening peak hour represents approximately 10 percent of the annual average daily traffic (AADT) at the intersection.

The study intersections were evaluated according to the crash analysis methodologies within ODOT's *Analysis Procedures Manual (APM)*. According to the APM, intersections which experience crash rates in excess of their respective 90th percentile crash rates should be "flagged for further analysis". *Exhibit 4-1: Intersection Crash Rates per MEV by Land Type and Traffic Control* of the APM indicates the following 90th percentile crash rates for various intersection configurations:

- Four-legged unsignalized intersection within an urban setting – 0.408
- Three-legged signalized intersection within an urban setting – 0.509
- Four-legged signalized intersection within an urban setting – 0.860

Crash rates in excess of the 90th percentile may be indicative of design deficiencies and therefore require a need for further investigation and possible mitigation.

Table 4 provides a summary of crash types while Table 5 summarizes crash severities and rates for each of the study intersections. Detailed crash data is provided in Appendix C.

Table 4: Crash Type Summary

Intersection		Crash Type							Total Crashes	
		Turn	Rear End	Angle	Fixed Object	Side swipe	Ped/Bike	Backing		Other
2	SE McBrod Avenue at SE 17 th Avenue	0	1	0	0	0	0	0	0	1
3	OR-224 at SE 17 th Avenue	0	7	0	1	0	0	0	0	8
4	OR-99E at SE 17 th Avenue	8	15	2	0	0	0	1	0	26

Table 5: Crash Severity and Rate Summary

Intersection		Severity					Total Crashes	ADT	Crash Rate	90 th % Rate
		PDO	C	B	A	Fatal				
2	SE McBrod Avenue at SE 17 th Avenue	1	0	0	0	0	1	11,770	0.047	0.408
3	OR-224 at SE 17 th Avenue	4	4	0	0	0	8	13,310	0.329	0.509
4	OR-99E at SE 17 th Avenue	13	10	3	0	0	26	34,320	0.415	0.860

Based on an analysis of the available crash data, all study intersections have calculated crash rates below the 90th percentile crash rate thresholds for similar intersection configurations within urban areas. No significant trends or crash patterns were identified at any of the study intersections that are indicative of safety concerns; accordingly, no safety mitigation is recommended per the crash data analysis.

Sight Distance Evaluation

A sight distance analysis was conducted at the proposed site access driveway. To evaluate the sight distance available at this future intersection, intersection sight distance was measured and recommended in accordance with the current AASHTO manual³. According to AASHTO, the driver’s eye is assumed to be 14.5 feet from the near edge of the nearest travel lane of the intersecting street and at a height of 3.5 feet above the minor-street approach pavement. The vehicle driver’s eye-height along the major-street approach is assumed to be 3.5 feet above the cross-street pavement.

Per the requirements in MMC 12.24.030.C, a clear vision area shall contain no planting, fence, wall, or structure exceeding three (3) feet in height from the street centerline grade. Trees exceeding the 3-foot height may be

³ American Association of State Highway and Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets, 7th Edition, 2018.



located in the area provided all branches and foliage are removed to the height of eight (8) feet above the grade.

Based on a posted speed of 20 mph along SE McBrod Avenue as well as a significant downgrade estimated at 11%, the minimum recommended intersection sight distance (ISD) is 225 feet and the minimum required stopping sight distance (SSD) is 130 feet.

At the proposed access location, sight distance to the east along SE McBrod Avenue were measured to exceed the ISD recommendation of 225 feet. Sight distance to the west was measured to be 150 feet, limited by a steep hill. However, the sight distance measurement meets the minimum required SSD of 130 feet.

Adequate sight distances are available at the proposed site access intersection along SE McBrod Avenue. No sight distance mitigation is necessary or recommended.

Access Management

The MMC 12.16.040 identifies access spacing standards for various roadway classifications. City staff have indicated that a single access will be permitted on SE McBrod Avenue; access is not permitted from SE 17th Avenue due to roadway classification, distance to the nearest intersection, and conflicts with the existing multiuse path.

MMC 12.16.040.C.4(b) requires a minimum distance of 100 feet from the nearest intersecting street face of curb to the nearest edge of driveway apron shall be maintained. Based on the most recent site plan, the proposed driveway access meets the minimum standard.

In order to better serve the number of units in the proposed development, City staff have noted that the driveway apron width shall be sized at 30 feet, which fits within the standards described in MMC 12.16.040.F.5 (driveway apron widths between 20-30 feet).

Warrant Analysis

Left-turn lane warrants and preliminary traffic signal warrants were examined for the study intersections where such treatments would be applicable.

Left-Turn Lane Warrants

A left-turn refuge lane is primarily a safety consideration for the major street, removing left-turning vehicles from the through traffic stream. Left-turn lane warrants along SE 17th Avenue were evaluated using methodologies provided outlined in the National Cooperative Highway Research Program (NCHRP) Report Number 457⁴. The methodology evaluates the need for a left-turn lane based on the number of left-turning vehicles, the number of travel lanes, the number of advancing and opposing vehicles, and the roadway travel speed. Detailed information on the warrant analysis is included in Appendix C.

⁴ Bonneson, James A. and Michael D. Fontaine, NCHRP Report 457: An Engineering Study Guide for Evaluating Intersection Improvements, Transportation Research Board, 2001.

Left-turn lane warrants were not evaluated at the site access because the proposed project is not expected to receive any left-turn trips into the site. The only existing study intersection without left-turn lanes is the intersection of SE McBrod Avenue at SE 17th Avenue. Left-turn lane warrants were examined for the northbound approach of SE 17th Avenue under year 2024 buildout conditions.

Left-turn lane warrants are not projected to be met under any of the analysis scenarios.

Preliminary Traffic Signal Warrants

Preliminary traffic signal warrants were examined for the unsignalized study intersections to determine whether the installation of a new traffic signal will be warranted at the intersection upon completion of the proposed development.

Due to insufficient traffic volumes, traffic signal warrants are not projected to be met at any of the unsignalized study intersections under any of the analysis scenarios.

Pedestrian, Biking, and Transit Facilities

A multimodal analysis was performed that included pedestrian routes, bicycle routes, and transit services within one-half mile of the project site.

Pedestrian Network

Within the immediate vicinity of the site, the surrounding land uses include moderate and high density residential to the north, south, and west, as well as industrial (North Milwaukie Employment, NME) use to the east. As the site is served by SE McBrod Avenue and SE 17th Avenue, further details on each of the pedestrian networks for these roadways are provided below.

SE McBrod Avenue

Complete sidewalks are provided along the north side of the roadway from SE 17th Avenue into the cul-de-sac located west of the project site. City staff have indicated that no additional curb or sidewalk improvements are required along this roadway as part of the proposed development.

SE 17th Avenue

A multiuse path is provided along the west side of the roadway from OR-99E to SE Ochoco Street. Along the east side of the roadway, sidewalks are provided intermittently.

In the project vicinity, there are marked crossings along SE 17th Avenue at the intersections with OR-99E, OR-224, SE McBrod Avenue, and SE Waverly Drive.

Bicycle Facilities

The City of Milwaukie's TSP lists various bicycle routes throughout Milwaukie on the Bicycle Master Plan. Near the project site, bicyclists have access to a north-south striped bicycle lane on the east side of SE 17th Avenue and a north-south multiuse path on the west side of the roadway.

On-site bicycle parking standards are listed in the MMC Section 19.505.4. Table 19.505.4.C.1 *Cottage Cluster Development Standards*, lists a minimum of 1.5 dry, secure bicycle parking spaces per home and a minimum of 0.5 guest bicycle parking spaces per home. The proposed development will construct 41 homes, which requires a minimum of 62 long-term bicycle spaces and 21 guest bicycle spaces. According to the most recent site plan,

the development will include 64 long-term and 22 guest bicycle spaces, which will exceed bicycle parking standards listed in the MMC.

Transit Facilities

Transit services are provided through TriMet, which currently operates 10 fixed transit routes throughout Milwaukie. The project site is located near one transit line that has stops within a quarter-mile walking/biking distance from the site. The nearest stops to the site are located near the intersection of SE Waverly Drive at SE 17th Avenue (Route 70).

Route 70 – 12th/NE 33rd Avenue provides service between SE Portland and Milwaukie, with notable stops near Lloyd Center and the Milwaukie City Center. Weekday service is scheduled from approximately 6:10 AM to 11:15 PM and has headways of approximately 15 to 60 minutes. Weekend service (both Saturday and Sunday) is scheduled from approximately 8:30 AM to 8:00 PM and has headways of approximately 15 to 60 minutes.

Complete sidewalks are located along the north side of SE McBrod Avenue, and a multiuse path is available along the west side of SE 17th Avenue to allow for safe travel for transit users between the site and the transit stops at the signalized intersection of NE Waverly Drive at SE 17th Avenue. At this intersection, there are marked crosswalks with pedestrian push-buttons located across all intersection legs for users to access the transit stops.

Operational Analysis

A capacity and delay analysis were conducted for each of the study intersections per the signalized and unsignalized intersection analysis methodologies in the *Highway Capacity Manual* (HCM)⁵. Intersections are generally evaluated based on the average control delay experienced by vehicles and are assigned a grade according to their operation. The level of service (LOS) of an intersection can range from LOS A, which indicates very little or no delay experienced by vehicles, to LOS F, which indicates a high degree of congestion and delay. The volume-to-capacity (v/c) ratio is a measure that compares the traffic volumes (demand) against the available capacity of an intersection.

The analysis was performed using the Synchro (version 11) software. The overall signalized v/c ratios were calculated following the methodologies in Chapter 16 of the ODOT APM for the critical intersection v/c ratio. This methodology was performed for all signalized intersections.

Performance Standards

The following agency mobility standards are applicable in the study area:

- The **City of Milwaukie** has the following mobility targets per the City of Milwaukie Transportation System Plan⁶:
 - For all intersection configurations, minimum LOS D.

⁵ Transportation Research Board, *Highway Capacity Manual 6th Edition*, 2016.

⁶ City of Milwaukie and DKS Associates, *Transportation System Plan*, October 20, 2018

- ODOT has the following mobility targets in the study area per the *Oregon Highway Plan*⁷:
 - The City of Milwaukie is within the Portland Metropolitan Region, and v/c ratio targets were determined from Table 7 of the *Oregon Highway Plan*.
 - OR-224 is listed as an “Other Principal Arterial Route” and has a target v/c ratio of 0.99 during the first peak hour.
 - OR-99E located within the downtown area of Milwaukie and has a target v/c ratio of 1.10 during the first peak hour.

Delay & Capacity Analysis

The LOS, delay, and v/c results of the capacity analysis are shown in Table 6 for the morning and evening peak hours. Detailed calculations as well as tables showing the relationship between delay and LOS are included in Appendix D.

Table 6: Capacity Analysis Summary

Intersection & Condition	Mobility Standard	AM Peak Hour			PM Peak Hour		
		LOS	Delay (s)	V/C	LOS	Delay (s)	V/C
1. Site Access at SE McBrod Avenue (proposed)¹							
2024 Buildout Conditions	LOS D	A	9	0.02	A	9	0.01
2. SE McBrod Avenue at SE 17th Avenue¹							
2023 Existing Conditions	LOS D	E	42	0.25	D	29	0.11
2024 Background Conditions		E	45	0.26	D	30	0.12
2024 Buildout Conditions		E	47	0.27	D	32	0.13
3. OR-224 at SE 17th Avenue²							
2023 Existing Conditions	0.99	B	11	0.93	B	10	0.65
2024 Background Conditions		B	12	0.95	B	10	0.66
2024 Buildout Conditions		B	12	0.95	B	10	0.67
4. OR-99E at SE 17th Avenue²							
2023 Existing Conditions	1.10	C	26	0.63	C	35	0.81
2024 Background Conditions		C	25	0.64	C	34	0.82
2024 Buildout Conditions		C	25	0.64	C	34	0.82

Table Notes:

1. For two-way stop-controlled intersection, the LOS, delay, and v/c are taken from the movement with the worst (highest) delay value

⁷ Oregon Department of Transportation, 1999 Oregon Highway Plan: Including amendments November 1999 through May 2015, 1999

2. The overall signalized v/c ratio for this intersection was calculated following the methodologies in Chapter 16 of the ODOT APM for the critical intersection v/c ratio.

The intersection of SE McBrod Avenue at SE 17th Avenue is currently operating above City of Milwaukie operational standards due to delays from westbound left-turning vehicles. Under 2024 buildout conditions, delays are anticipated to worsen by two seconds when compared to 2024 background conditions. Although the intersection exceeds the City standard, the v/c ratios are low, 0.27 or less during the morning peak hour and 0.13 or less during the evening peak hour, indicating the intersection can easily accommodate the additional project traffic demand.

The intersection of SE McBrod Avenue at SE 17th Avenue is currently two-way stop-controlled on the eastbound and westbound approaches. Drivers can use alternate routes such as SE Milport Road, which is a signalized intersection with SE 17th Avenue and offers permitted left-turns.

The proposed development is expected to generate 1 westbound trip during the morning peak period and 2 westbound trips during the evening peak period. There are no planned projects in the Milwaukie TSP related to improving the capacity at the intersection. Therefore, no operational mitigation is necessary or recommended at the intersection.

All other study intersections are currently operating acceptably per City of Milwaukie and ODOT standards and are projected to continue operating acceptably through the 2024 site buildout year. No operational mitigation is necessary or recommended at these intersections.

Queuing Analysis

An analysis of projected queuing was conducted for the study intersections. The 95th percentile queue lengths were estimated based on the same Synchro/SimTraffic simulations used for the delay calculations. The 95th percentile queue is a statistical measurement which indicates there is a 5 percent chance that the queue may exceed this length during the analysis period; however, given this is a probability, the 95th percentile queue length may theoretically never be met or observed in the field.

The 95th percentile queue lengths reported in the simulation are presented in Table 7 for the morning and evening peak hours. All queues more than 5 feet longer than a multiple of 25 were rounded up to the nearest 25 feet, equivalent to an average vehicle length. Those that were 5 feet or less than a multiple of 25 were rounded down since 5 feet is equivalent to the space between queued vehicles. Detailed queuing analysis reports are included in Appendix D.

Table 7: 95th Percentile Queuing Analysis Summary

Intersection/Movement	Available Storage (ft)	2024 Background Queue (ft)		2024 Buildout Queue (ft)	
		Morning	Evening	Morning	Evening
1. Site Access at SE McBrod Avenue					
SB Approach	50	-	-	50	50
2. SE McBrod Avenue at SE 17th Avenue					
EB Approach	50	25	25	50	50
WB Approach	300	100	50	75	50
NB Approach	525	25	25	25	50
SB Approach	200	0	0	25	0
3. OR-224 at SE 17th Avenue					
WB Left	175	75	75	50	75
WB Right	200	175	100	150	100
NB Through	750	250	225	300	225
NB Right	150	75	-	100	75
SB Left	200	175	175	150	175
SB Through	525	75	100	50	75
4. OR-99E at SE 17th Avenue/SE Harrison Street					
EB Left-Through	800	100	300	100	275
EB Right	175	100	200	100	200
WB Left	200	75	200	125	200
WB Left-Through-Right	200	175	275	200	275
NB Left	425	400	350	425	375
NB Through	450	450	325	425	350
NB Through-Right	200	425	300	450	300
SB Left	375	175	325	150	350
SB Through	>1,000	300	850	325	825
SB Through-Right	>1,000	275	850	300	775

In general, changes in 95th percentile queuing between the year 2024 background and buildout conditions are anticipated to be small, one vehicle or two vehicles. Queues for right-turns on the eastbound approach of SE 17th Avenue are expected to extend beyond the available storage length of the right-turn lane during the evening peak hour. Queues on the westbound approach of SE Harrison Street are expected to extend through the intersection with SE Main Street during the evening peak hour. Queues on the northbound approach of OR-99E are expected to extend through the intersection with SE Jackson Street during the morning and evening peak hours.



Conclusions

Key findings of this study include:

- Based on a review of the most recent five years of available crash data, all study intersections have calculated crash rates below the 90th percentile crash rate thresholds for similar intersection configurations within urban areas. No significant trends or crash patterns were identified at any of the study intersections, and no safety mitigation is recommended per the crash data analysis.
- Adequate sight distances are available at the proposed site access intersection along SE McBrod Avenue. No sight distance mitigation is necessary or recommended.
- MMC 12.16.040.C.4(b) requires a minimum distance of 100 feet from the nearest intersecting street face of curb to the nearest edge of driveway apron shall be maintained. Based on the most recent site plan, the proposed driveway access meets the minimum standard.
- Left-turn lane warrants are not projected to be met under any of the analysis scenarios.
- Due to insufficient traffic volumes, traffic signal warrants are not projected to be met at any of the unsignalized study intersections under any of the analysis scenarios.
- The intersection of SE McBrod Avenue at SE 17th Avenue is currently operating above City of Milwaukie operational standards due to delays from westbound left-turning vehicles. However, the v/c ratios are low indicating the intersection can easily accommodate the additional project traffic demand. The proposed development is expected to generate 1 westbound trip during the morning peak period and 2 westbound trips during the evening peak period. There are no planned projects in the Milwaukie TSP related to improving the capacity at the intersection. Therefore, no operational mitigation is necessary or recommended at the intersection.
- All other study intersections are currently operating acceptably per City of Milwaukie and ODOT standards and are projected to continue operating acceptably through the 2024 site buildout year. No operational mitigation is necessary or recommended at these intersections.
- In general, changes in 95th percentile queuing between the year 2024 background and buildout conditions are anticipated to be small, one vehicle or two vehicles.

Appendix A – Site Information

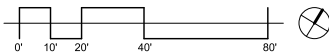
Site Plan

Trip Generation Calculations





1 / PROPOSED SITE PLAN
 scale: 1" = 20'-0"



ZONING INFO		PARKING INFO		LEGEND	
PER TABLE 19.505.4.C.1		PER TABLE 19.505.4.C.1		TREE ##	SEE AROBORIST'S REPORT FOR COMPLETE TREE INVENTORY.
ZONE	R-MD MODERATE DENSITY RESIDENTIAL	ZONE	R-MD		TREE TO BE REMOVED. SEE TREE PRESERVATION PLAN SHEET L1
SETBACKS		41 ATTACHED COTTAGES			UNIT ENTRY
FRONT	10' MIN. 20' MAX	AUTOMOBILE PARKING			
SIDE	5'	REQ'D	0.5 CARS/HOME 41 x 0.5 = 21 CARS		
REAR	5'	PROVIDED	61 CARS 1.5 CARS/HOME		
BUILDING HEIGHT		BICYCLE PARKING			
MAX	25' OR 2 STORIES	REQ'D LONG TERM	1.5 BIKES/HOME 41 x 1.5 = 62 BIKES		
BETWEEN 5' & 10' OF REAR LOT LINE	15' MAX	PROVIDED	40 IN-UNIT BIKES 24 IN BIKE SHED 64 TOTAL BIKES		
IMPERVIOUS AREA		REQ'D GUEST	0.5 BIKES/HOME 42 x 0.5 = 21 BIKES		
MAX ALLOWED	60%	PROVIDED	22 BIKES		
PROPOSED	53%				
VEGETATION					
MINIMUM	35%				
PROPOSED	47%				

preliminary
 not for
 construction

DATE: 09/01/2023
 DRAWN BY: KR
 JOB NO: 22-042
 REV NO:

PROPOSED SITE PLAN

A101



TRIP GENERATION CALCULATIONS
Existing Conditions

Land Use: Single-Family Detached Housing
Land Use Code: 210
Land Use Subcategory: All Sites
Setting/Location: General Urban/Suburban
Variable: Dwelling Units
Trip Type: Vehicle
Variable Quantity: 1

AM PEAK HOUR

Trip Rate: 0.7

	Enter	Exit	Total
Directional Split	25%	75%	
Trip Ends	0	1	1

PM PEAK HOUR

Trip Rate: 0.94

	Enter	Exit	Total
Directional Split	63%	37%	
Trip Ends	1	0	1

WEEKDAY

Trip Rate: 9.43

	Enter	Exit	Total
Directional Split	50%	50%	
Trip Ends	5	5	10



TRIP GENERATION CALCULATIONS
Proposed Development

Land Use: Single-Family Attached Housing
Land Use Code: 215
Land Use Subcategory: All Sites
Setting/Location: General Urban/Suburban
Variable: Dwelling Units
Trip Type: Vehicle
Variable Quantity: **41**

AM PEAK HOUR

Trip Rate: 0.48

	Enter	Exit	Total
Directional Split	25%	75%	
Trip Ends	5	15	20

PM PEAK HOUR

Trip Rate: 0.57

	Enter	Exit	Total
Directional Split	59%	41%	
Trip Ends	14	9	23

WEEKDAY

Trip Rate: 7.2

	Enter	Exit	Total
Directional Split	50%	50%	
Trip Ends	148	148	296

Appendix B – Volumes

Traffic Counts





(303) 216-2439

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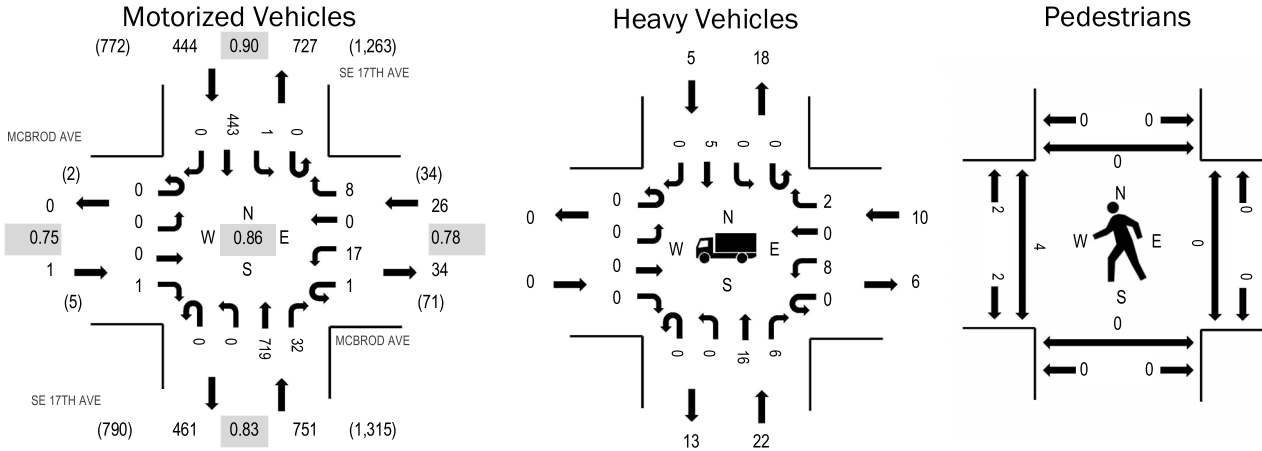
Location: 1 SE 17TH AVE & MCBROD AVE AM

Date: Tuesday, February 7, 2023

Peak Hour: 07:35 AM - 08:35 AM

Peak 15-Minutes: 07:35 AM - 07:50 AM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	0.0%	0.75
WB	38.5%	0.78
NB	2.9%	0.83
SB	1.1%	0.90
All	3.0%	0.86

Traffic Counts - Motorized Vehicles

Interval Start Time	MCBROD AVE Eastbound				MCBROD AVE Westbound				SE 17TH AVE Northbound				SE 17TH AVE Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
7:00 AM	1	0	0	0	0	0	0	0	0	0	24	2	0	1	18	0	46	1,044
7:05 AM	0	0	0	0	0	0	0	0	0	0	51	1	0	0	21	0	73	1,095
7:10 AM	0	0	0	0	0	0	0	0	0	0	35	2	0	0	22	0	59	1,124
7:15 AM	0	0	0	0	0	0	0	0	0	0	31	5	0	1	17	0	54	1,162
7:20 AM	0	0	0	0	0	0	0	2	0	0	53	5	0	0	28	0	88	1,205
7:25 AM	0	0	1	0	0	0	0	0	0	0	52	2	0	0	22	0	77	1,190
7:30 AM	0	0	0	0	0	0	0	0	0	0	44	2	0	0	29	0	75	1,196
7:35 AM	0	0	0	0	0	0	0	1	0	0	72	4	0	0	34	0	111	1,222
7:40 AM	0	0	0	0	0	0	0	1	0	0	67	0	0	0	45	0	113	1,213
7:45 AM	0	0	0	1	0	2	0	0	0	0	78	2	0	0	47	0	130	1,188
7:50 AM	0	0	0	0	0	1	0	0	0	0	72	4	0	0	32	0	109	1,147
7:55 AM	0	0	0	0	0	0	0	1	0	0	67	4	0	0	37	0	109	1,111
8:00 AM	0	0	0	0	0	3	0	0	0	0	50	2	0	0	42	0	97	1,082
8:05 AM	0	0	0	0	0	1	0	1	0	0	55	5	0	1	39	0	102	
8:10 AM	0	0	0	0	0	3	0	1	0	0	53	4	0	0	36	0	97	
8:15 AM	0	0	0	0	0	1	0	1	0	0	52	1	0	0	42	0	97	
8:20 AM	0	0	0	0	1	1	0	0	0	0	39	3	0	0	29	0	73	
8:25 AM	0	0	0	0	0	1	0	2	0	0	55	1	0	0	24	0	83	
8:30 AM	0	0	0	0	0	4	0	0	0	0	59	2	0	0	36	0	101	
8:35 AM	0	0	0	0	0	1	0	1	0	0	59	4	0	1	36	0	102	
8:40 AM	0	1	0	0	0	1	0	1	0	0	53	2	0	0	30	0	88	
8:45 AM	0	0	0	0	0	1	0	0	0	0	56	2	0	0	30	0	89	
8:50 AM	0	0	0	0	0	0	0	0	0	0	41	3	0	0	29	0	73	
8:55 AM	0	0	0	1	0	1	0	0	0	0	32	3	0	0	42	1	80	
Count Total	1	1	1	2	1	21	0	12	0	0	1,250	65	0	4	767	1	2,126	
Peak Hour	0	0	0	1	1	17	0	8	0	0	719	32	0	1	443	0	1,222	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	0	0	2	2	7:00 AM	0	0	0	0	0	7:00 AM	1	0	0	0	1
7:05 AM	0	4	0	0	4	7:05 AM	0	0	0	0	0	7:05 AM	1	0	0	0	1
7:10 AM	0	4	0	2	6	7:10 AM	0	0	0	0	0	7:10 AM	3	0	0	0	3
7:15 AM	0	3	0	1	4	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	0	3	2	0	5	7:20 AM	0	0	0	0	0	7:20 AM	1	0	0	0	1
7:25 AM	0	2	0	1	3	7:25 AM	0	0	0	0	0	7:25 AM	1	0	0	0	1
7:30 AM	0	0	0	1	1	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	0	1	0	0	1	7:35 AM	0	0	0	0	0	7:35 AM	2	0	0	0	2
7:40 AM	0	1	0	1	2	7:40 AM	0	0	0	0	0	7:40 AM	3	0	0	0	3
7:45 AM	0	2	1	0	3	7:45 AM	0	0	0	0	0	7:45 AM	1	0	0	0	1
7:50 AM	0	0	1	0	1	7:50 AM	0	0	0	0	0	7:50 AM	1	0	0	0	1
7:55 AM	0	2	0	2	4	7:55 AM	0	0	0	0	0	7:55 AM	2	0	0	0	2
8:00 AM	0	2	1	0	3	8:00 AM	0	0	0	0	0	8:00 AM	1	0	0	0	1
8:05 AM	0	1	1	1	3	8:05 AM	0	0	0	0	0	8:05 AM	1	0	0	0	1
8:10 AM	0	2	2	1	5	8:10 AM	0	0	0	0	0	8:10 AM	1	0	0	0	1
8:15 AM	0	2	0	0	2	8:15 AM	0	1	0	0	1	8:15 AM	1	0	0	0	1
8:20 AM	0	3	1	0	4	8:20 AM	0	0	0	0	0	8:20 AM	2	0	0	0	2
8:25 AM	0	3	1	0	4	8:25 AM	0	0	0	0	0	8:25 AM	2	0	0	0	2
8:30 AM	0	3	2	0	5	8:30 AM	0	0	0	0	0	8:30 AM	1	0	0	0	1
8:35 AM	0	3	2	5	10	8:35 AM	0	0	0	0	0	8:35 AM	3	0	0	0	3
8:40 AM	0	3	0	1	4	8:40 AM	0	0	0	0	0	8:40 AM	1	0	0	0	1
8:45 AM	0	2	0	1	3	8:45 AM	0	0	0	0	0	8:45 AM	1	1	0	0	2
8:50 AM	0	1	0	0	1	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	1	6	0	2	9	8:55 AM	0	0	0	0	0	8:55 AM	1	0	0	0	1
Count Total	1	53	14	21	89	Count Total	0	1	0	0	1	Count Total	31	1	0	0	32
Peak Hour	0	22	10	5	37	Peak Hour	0	1	0	0	1	Peak Hour	18	0	0	0	18



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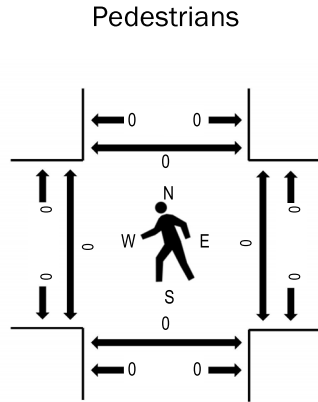
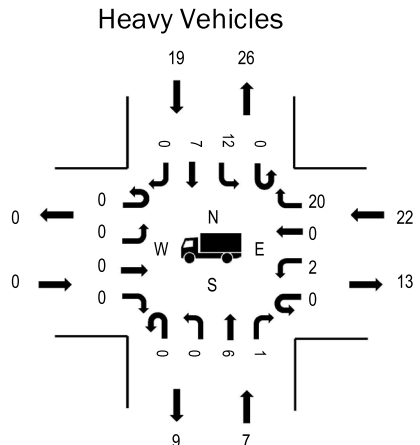
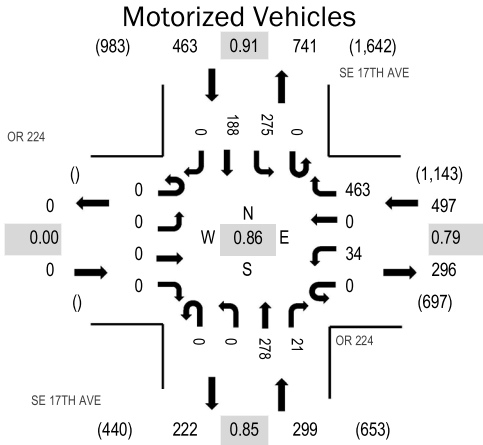
Location: 2 SE 17TH AVE & OR 224 AM

Date: Tuesday, February 7, 2023

Peak Hour: 07:40 AM - 08:40 AM

Peak 15-Minutes: 07:40 AM - 07:55 AM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	0.0%	0.00
WB	4.4%	0.79
NB	2.3%	0.85
SB	4.1%	0.91
All	3.8%	0.86

Traffic Counts - Motorized Vehicles

Interval Start Time	OR 224 Eastbound				OR 224 Westbound				SE 17TH AVE Northbound				SE 17TH AVE Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
6:00 AM	0	0	0	0	0	1	0	13	0	0	1	1	0	7	2	0	25	575
6:05 AM	0	0	0	0	0	1	0	12	0	0	5	1	0	8	2	0	29	598
6:10 AM	0	0	0	0	0	0	0	12	0	0	5	1	0	10	0	0	28	640
6:15 AM	0	0	0	0	0	1	0	13	0	0	6	1	0	10	4	0	35	675
6:20 AM	0	0	0	0	0	4	0	17	0	0	6	0	0	7	3	0	37	703
6:25 AM	0	0	0	0	0	2	0	19	0	0	13	0	0	10	2	0	46	750
6:30 AM	0	0	0	0	0	1	0	20	0	0	12	2	0	15	4	0	54	781
6:35 AM	0	0	0	0	0	1	0	18	0	0	10	4	0	20	4	0	57	813
6:40 AM	0	0	0	0	0	3	0	27	0	0	11	2	0	9	2	0	54	851
6:45 AM	0	0	0	0	0	2	0	23	0	0	13	1	0	22	5	0	66	919
6:50 AM	0	0	0	0	0	2	0	34	0	0	11	1	0	19	6	0	73	967
6:55 AM	0	0	0	0	0	4	0	27	0	0	10	1	0	17	12	0	71	1,023
7:00 AM	0	0	0	0	0	2	0	20	0	0	6	3	0	14	3	0	48	1,062
7:05 AM	0	0	0	0	0	0	0	27	0	0	14	3	0	16	11	0	71	1,119
7:10 AM	0	0	0	0	0	4	0	28	0	0	12	1	0	14	4	0	63	1,137
7:15 AM	0	0	0	0	0	4	0	24	0	0	15	2	0	13	5	0	63	1,197
7:20 AM	0	0	0	0	0	1	0	32	0	0	22	1	0	18	10	0	84	1,220
7:25 AM	0	0	0	0	0	2	0	30	0	0	25	1	0	14	5	0	77	1,216
7:30 AM	0	0	0	0	0	1	0	36	0	0	17	0	0	21	11	0	86	1,233
7:35 AM	0	0	0	0	0	2	0	37	0	0	23	2	0	18	13	0	95	1,250
7:40 AM	0	0	0	0	0	1	0	46	0	0	33	3	0	26	13	0	122	1,259
7:45 AM	0	0	0	0	0	6	0	39	0	0	23	1	0	28	17	0	114	1,238
7:50 AM	0	0	0	0	0	3	0	57	0	0	28	0	0	33	8	0	129	1,207
7:55 AM	0	0	0	0	0	3	0	50	0	0	15	1	0	20	21	0	110	1,169
8:00 AM	0	0	0	0	0	1	0	36	0	0	30	3	0	21	14	0	105	1,142
8:05 AM	0	0	0	0	0	3	0	38	0	0	16	0	0	19	13	0	89	
8:10 AM	0	0	0	0	0	1	0	38	0	0	24	3	0	35	22	0	123	
8:15 AM	0	0	0	0	0	4	0	30	0	0	19	2	0	16	15	0	86	

8:20 AM	0	0	0	0	0	0	0	22	0	0	24	0	0	18	16	0	80
8:25 AM	0	0	0	0	0	4	0	30	0	0	25	2	0	14	19	0	94
8:30 AM	0	0	0	0	0	4	0	34	0	0	17	4	0	28	16	0	103
8:35 AM	0	0	0	0	0	4	0	43	0	0	24	2	0	17	14	0	104
8:40 AM	0	0	0	0	0	4	0	42	0	0	20	4	0	20	11	0	101
8:45 AM	0	0	0	0	0	2	0	25	0	0	22	1	0	22	11	0	83
8:50 AM	0	0	0	0	0	2	0	31	0	0	24	3	0	15	16	0	91
8:55 AM	0	0	0	0	0	12	0	21	0	0	10	5	0	21	14	0	83
Count Total	0	0	0	0	0	92	0	1,051	0	0	591	62	0	635	348	0	2,779
Peak Hour	0	0	0	0	0	34	0	463	0	0	278	21	0	275	188	0	1,259

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
6:00 AM	0	0	1	0	1	6:00 AM	0	0	0	0	0	6:00 AM	0	0	0	0	0
6:05 AM	0	0	4	0	4	6:05 AM	0	0	0	0	0	6:05 AM	0	0	0	0	0
6:10 AM	0	1	4	0	5	6:10 AM	0	0	0	0	0	6:10 AM	0	0	0	0	0
6:15 AM	0	0	1	0	1	6:15 AM	0	0	0	0	0	6:15 AM	0	0	0	0	0
6:20 AM	0	0	2	0	2	6:20 AM	0	0	0	0	0	6:20 AM	0	0	0	0	0
6:25 AM	0	0	2	0	2	6:25 AM	0	0	0	0	0	6:25 AM	0	0	0	0	0
6:30 AM	0	0	0	1	1	6:30 AM	0	0	0	0	0	6:30 AM	0	0	0	0	0
6:35 AM	0	0	3	1	4	6:35 AM	0	0	0	0	0	6:35 AM	0	0	0	0	0
6:40 AM	0	2	0	1	3	6:40 AM	0	0	0	0	0	6:40 AM	0	0	0	0	0
6:45 AM	0	1	1	1	3	6:45 AM	0	0	0	0	0	6:45 AM	0	0	0	0	0
6:50 AM	0	0	1	1	2	6:50 AM	0	0	0	0	0	6:50 AM	0	0	0	0	0
6:55 AM	0	2	0	0	2	6:55 AM	0	0	0	0	0	6:55 AM	0	0	0	0	0
7:00 AM	0	0	0	2	2	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	0	1	3	0	4	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	0	1	2	1	4	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	0	1	5	1	7	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	0	1	2	1	4	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	0	0	1	0	1	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	0	0	1	2	3	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	0	1	0	0	1	7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0
7:45 AM	0	0	2	2	4	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
7:50 AM	0	1	0	1	2	7:50 AM	0	0	0	1	1	7:50 AM	0	0	0	0	0
7:55 AM	0	0	2	2	4	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	0	2	1	1	4	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	0	0	1	0	1	8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0
8:10 AM	0	0	2	3	5	8:10 AM	0	0	0	0	0	8:10 AM	0	0	0	0	0
8:15 AM	0	0	2	0	2	8:15 AM	0	1	0	0	1	8:15 AM	0	0	0	0	0
8:20 AM	0	1	1	1	3	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	0	1	4	1	6	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	0	1	2	2	5	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	0	0	5	6	11	8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0
8:40 AM	0	1	3	1	5	8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	0	0
8:45 AM	0	0	0	1	1	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	0	0	2	0	2	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	0	1	4	1	6	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
Count Total	0	19	64	34	117	Count Total	0	1	0	1	2	Count Total	0	0	0	0	0
Peak Hour	0	7	22	19	48	Peak Hour	0	1	0	1	2	Peak Hour	0	0	0	0	0



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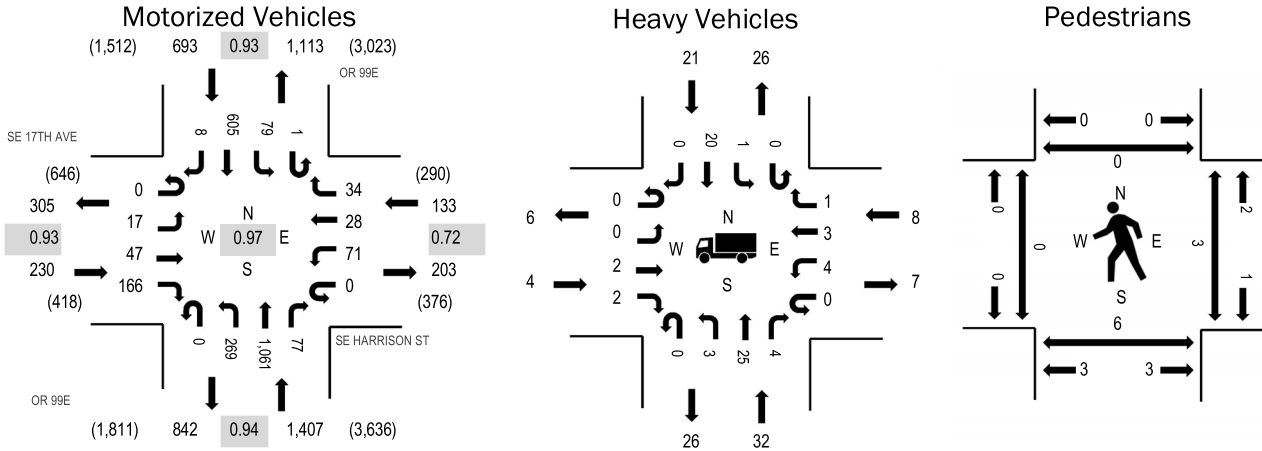
Location: 3 OR 99E & SE HARRISON ST AM

Date: Tuesday, February 7, 2023

Peak Hour: 07:35 AM - 08:35 AM

Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	1.7%	0.93
WB	6.0%	0.72
NB	2.3%	0.94
SB	3.0%	0.93
All	2.6%	0.97

Traffic Counts - Motorized Vehicles

Interval Start Time	SE 17TH AVE Eastbound				SE HARRISON ST Westbound				OR 99E Northbound				OR 99E Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
6:00 AM	0	0	0	2	0	2	1	1	0	2	53	1	0	0	13	2	77	1,350
6:05 AM	0	0	0	1	0	2	0	2	0	5	55	1	0	3	14	0	83	1,406
6:10 AM	0	0	0	2	0	1	2	0	0	3	66	2	0	1	18	0	95	1,468
6:15 AM	0	0	0	3	0	1	0	1	0	6	72	2	0	0	15	0	100	1,538
6:20 AM	0	2	0	4	0	2	1	3	0	5	53	4	0	2	11	1	88	1,605
6:25 AM	0	0	0	2	0	2	1	4	0	11	82	3	0	3	19	5	132	1,703
6:30 AM	0	2	0	2	0	0	0	0	0	13	61	0	0	1	13	1	93	1,764
6:35 AM	0	2	1	2	0	2	1	2	0	5	94	4	0	1	33	3	150	1,858
6:40 AM	0	3	0	2	0	5	2	0	0	17	80	4	0	0	27	1	141	1,940
6:45 AM	0	0	0	5	0	5	0	1	0	8	69	4	0	3	24	1	120	1,981
6:50 AM	0	0	1	5	0	4	1	3	0	12	76	2	0	4	22	2	132	2,078
6:55 AM	0	2	2	6	0	1	0	0	0	9	95	3	0	1	19	1	139	2,158
7:00 AM	0	1	0	4	0	7	1	1	0	6	79	3	0	4	26	1	133	2,223
7:05 AM	0	0	0	8	0	2	0	0	0	14	86	3	0	2	30	0	145	2,305
7:10 AM	0	0	1	5	0	7	5	2	0	13	89	4	0	4	35	0	165	2,362
7:15 AM	0	0	2	6	0	3	1	1	0	11	95	6	0	3	38	1	167	2,407
7:20 AM	0	1	2	11	0	4	4	2	0	26	99	6	0	2	27	2	186	2,430
7:25 AM	0	2	0	6	0	2	0	2	0	15	108	7	0	6	43	2	193	2,441
7:30 AM	0	1	2	10	0	8	0	4	0	18	106	2	0	0	36	0	187	2,461
7:35 AM	0	0	0	18	0	4	0	2	0	24	110	7	0	3	63	1	232	2,463
7:40 AM	0	4	1	14	0	10	2	0	0	32	79	7	0	0	33	0	182	2,426
7:45 AM	0	0	2	14	0	5	1	0	0	21	100	8	0	0	65	1	217	2,407
7:50 AM	0	2	4	10	0	7	1	1	0	31	94	11	0	1	49	1	212	2,358
7:55 AM	0	1	1	19	0	1	0	1	0	21	91	7	1	9	49	3	204	2,330
8:00 AM	0	2	3	17	0	7	4	2	0	16	79	4	0	8	73	0	215	2,283
8:05 AM	0	3	3	12	0	6	1	5	0	15	109	4	0	3	41	0	202	
8:10 AM	0	1	7	12	0	9	2	3	0	24	84	13	0	12	43	0	210	
8:15 AM	0	0	5	13	0	4	3	1	0	15	82	1	0	16	49	1	190	

8:20 AM	0	2	10	10	0	9	6	6	0	25	76	8	0	11	33	1	197
8:25 AM	0	2	4	14	0	2	4	4	0	21	79	5	0	14	64	0	213
8:30 AM	0	0	7	13	0	7	4	9	0	24	78	2	0	2	43	0	189
8:35 AM	0	2	3	9	0	6	3	3	0	14	80	8	0	3	64	0	195
8:40 AM	0	0	1	13	0	7	4	2	0	16	71	5	0	4	40	0	163
8:45 AM	0	2	2	13	0	7	3	2	0	20	64	4	0	1	49	1	168
8:50 AM	0	0	3	11	0	2	1	1	0	25	67	8	0	5	60	1	184
8:55 AM	0	0	3	13	0	3	3	1	1	8	52	8	0	3	62	0	157
Count Total	0	37	70	311	0	156	62	72	1	551	2,913	171	1	135	1,343	33	5,856
Peak Hour	0	17	47	166	0	71	28	34	0	269	1,061	77	1	79	605	8	2,463

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
6:00 AM	0	2	0	1	3	6:00 AM	0	0	0	0	0	6:00 AM	0	0	0	0	0
6:05 AM	0	0	0	1	1	6:05 AM	0	0	0	0	0	6:05 AM	0	1	0	0	1
6:10 AM	0	2	1	1	4	6:10 AM	0	0	0	0	0	6:10 AM	0	0	0	0	0
6:15 AM	0	2	0	1	3	6:15 AM	0	0	0	0	0	6:15 AM	0	0	0	0	0
6:20 AM	0	0	0	1	1	6:20 AM	0	0	0	0	0	6:20 AM	0	1	0	0	1
6:25 AM	0	3	1	2	6	6:25 AM	0	0	0	0	0	6:25 AM	0	0	0	0	0
6:30 AM	0	0	0	2	2	6:30 AM	0	0	0	0	0	6:30 AM	0	1	0	0	1
6:35 AM	0	1	0	2	3	6:35 AM	0	0	0	0	0	6:35 AM	0	0	0	0	0
6:40 AM	1	2	1	2	6	6:40 AM	0	0	0	0	0	6:40 AM	0	2	0	0	2
6:45 AM	0	0	2	0	2	6:45 AM	0	0	0	0	0	6:45 AM	0	0	0	0	0
6:50 AM	0	0	0	3	3	6:50 AM	0	0	0	0	0	6:50 AM	0	0	0	0	0
6:55 AM	0	2	0	0	2	6:55 AM	0	0	0	0	0	6:55 AM	0	1	0	0	1
7:00 AM	2	0	1	0	3	7:00 AM	0	0	0	0	0	7:00 AM	0	0	2	0	2
7:05 AM	0	2	0	2	4	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	1	1	1	2	5	7:10 AM	0	0	0	0	0	7:10 AM	0	2	0	0	2
7:15 AM	2	1	0	1	4	7:15 AM	0	0	0	0	0	7:15 AM	0	1	0	0	1
7:20 AM	1	3	0	1	5	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	0	1	0	4	5	7:25 AM	0	1	1	0	2	7:25 AM	0	1	0	0	1
7:30 AM	0	2	0	1	3	7:30 AM	0	0	0	0	0	7:30 AM	0	1	0	0	1
7:35 AM	0	3	0	2	5	7:35 AM	0	0	0	0	0	7:35 AM	0	0	2	0	2
7:40 AM	0	4	1	1	6	7:40 AM	0	0	0	0	0	7:40 AM	0	2	0	0	2
7:45 AM	2	3	0	4	9	7:45 AM	0	0	0	0	0	7:45 AM	0	2	0	0	2
7:50 AM	0	5	0	3	8	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	1	4	0	2	7	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	0	3	1	2	6	8:00 AM	0	0	0	0	0	8:00 AM	0	1	0	0	1
8:05 AM	0	2	1	1	4	8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0
8:10 AM	1	1	1	1	4	8:10 AM	0	0	0	0	0	8:10 AM	0	2	1	0	3
8:15 AM	0	2	0	1	3	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:20 AM	0	0	2	0	2	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	0	2	1	1	4	8:25 AM	0	0	0	0	0	8:25 AM	0	1	0	0	1
8:30 AM	0	3	1	3	7	8:30 AM	0	0	0	0	0	8:30 AM	0	2	0	0	2
8:35 AM	3	0	0	4	7	8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0
8:40 AM	3	2	1	3	9	8:40 AM	0	0	0	0	0	8:40 AM	0	4	0	0	4
8:45 AM	0	2	0	0	2	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	1	4	0	4	9	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	2	3	0	2	7	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
Count Total	20	67	16	61	164	Count Total	0	1	1	0	2	Count Total	0	25	5	0	30
Peak Hour	4	32	8	21	65	Peak Hour	0	0	0	0	0	Peak Hour	0	10	3	0	13



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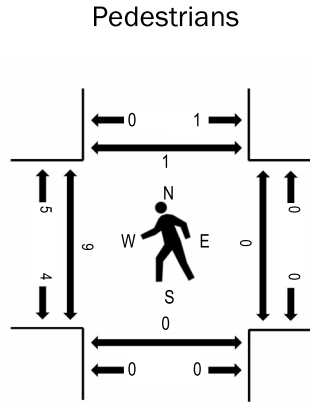
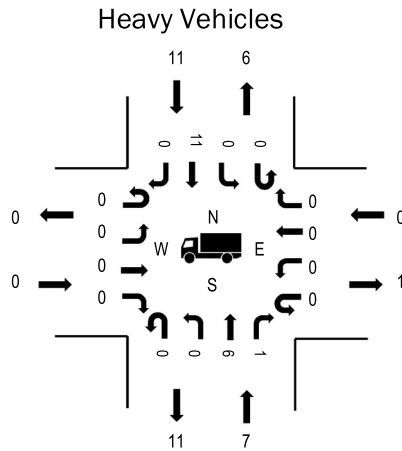
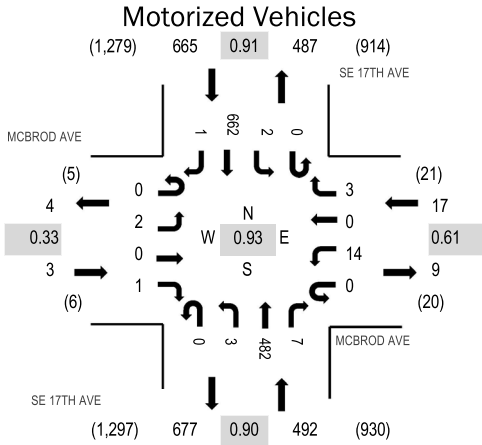
Location: 1 SE 17TH AVE & MCBROD AVE PM

Date: Tuesday, February 7, 2023

Peak Hour: 04:10 PM - 05:10 PM

Peak 15-Minutes: 04:35 PM - 04:50 PM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	0.0%	0.33
WB	0.0%	0.61
NB	1.4%	0.90
SB	1.7%	0.91
All	1.5%	0.93

Traffic Counts - Motorized Vehicles

Interval Start Time	MCBROD AVE Eastbound				MCBROD AVE Westbound				SE 17TH AVE Northbound				SE 17TH AVE Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	0	0	0	0	1	0	0	0	0	31	0	0	0	55	0	87	1,157
4:05 PM	0	0	0	0	0	1	0	0	0	0	28	1	0	0	49	0	79	1,153
4:10 PM	0	0	0	0	0	1	0	0	0	0	46	1	0	0	54	0	102	1,177
4:15 PM	0	1	0	0	0	1	0	0	0	0	51	0	0	0	54	0	107	1,166
4:20 PM	0	0	0	0	0	1	0	0	0	0	35	0	0	0	69	0	105	1,148
4:25 PM	0	0	0	0	0	0	0	0	0	0	38	0	0	0	57	1	96	1,142
4:30 PM	0	0	0	0	0	1	0	0	0	1	34	1	0	1	39	0	77	1,142
4:35 PM	0	0	0	0	0	1	0	0	0	0	40	2	0	1	49	0	93	1,156
4:40 PM	0	0	0	0	0	1	0	0	0	0	54	0	0	0	65	0	120	1,171
4:45 PM	0	1	0	0	0	1	0	3	0	0	31	1	0	0	68	0	105	1,141
4:50 PM	0	0	0	0	0	2	0	0	0	1	31	1	0	0	46	0	81	1,107
4:55 PM	0	0	0	1	0	0	0	0	0	1	42	0	0	0	61	0	105	1,105
5:00 PM	0	0	0	0	0	2	0	0	0	0	31	1	0	0	49	0	83	1,079
5:05 PM	0	0	0	0	0	3	0	0	0	0	49	0	0	0	51	0	103	
5:10 PM	0	0	0	0	0	0	0	0	0	0	44	1	0	0	46	0	91	
5:15 PM	0	0	0	0	0	0	0	0	0	0	43	0	0	0	46	0	89	
5:20 PM	0	0	0	0	0	0	0	0	0	0	42	0	0	0	57	0	99	
5:25 PM	0	0	0	0	0	0	0	0	0	1	39	1	0	0	55	0	96	
5:30 PM	0	0	0	0	0	1	0	0	0	0	37	2	0	0	51	0	91	
5:35 PM	0	0	0	0	0	1	0	0	0	0	34	2	0	0	71	0	108	
5:40 PM	0	0	1	0	0	0	0	0	0	0	35	3	0	0	51	0	90	
5:45 PM	0	0	0	2	0	0	0	0	0	0	26	0	0	0	43	0	71	
5:50 PM	0	0	0	0	0	0	0	0	0	0	33	0	0	0	46	0	79	
5:55 PM	0	0	0	0	0	0	0	0	0	0	35	0	0	0	44	0	79	
Count Total	0	2	1	3	0	18	0	3	0	4	909	17	0	2	1,276	1	2,236	
Peak Hour	0	2	0	1	0	14	0	3	0	3	482	7	0	2	662	1	1,177	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	1	0	0	1	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0
4:05 PM	0	2	0	1	3	4:05 PM	0	0	0	0	0	4:05 PM	0	1	0	0	1
4:10 PM	0	1	0	2	3	4:10 PM	0	0	0	0	0	4:10 PM	2	0	0	0	2
4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0	4:15 PM	2	0	0	0	2
4:20 PM	0	1	0	0	1	4:20 PM	0	0	0	0	0	4:20 PM	5	0	0	0	5
4:25 PM	0	1	0	2	3	4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0
4:30 PM	0	1	0	1	2	4:30 PM	0	0	0	0	0	4:30 PM	5	0	0	0	5
4:35 PM	0	0	0	1	1	4:35 PM	0	0	0	0	0	4:35 PM	2	0	0	0	2
4:40 PM	0	0	0	1	1	4:40 PM	0	0	0	0	0	4:40 PM	3	0	0	0	3
4:45 PM	0	0	0	2	2	4:45 PM	0	0	0	0	0	4:45 PM	2	0	0	0	2
4:50 PM	0	2	0	0	2	4:50 PM	0	0	0	0	0	4:50 PM	4	0	0	0	4
4:55 PM	0	1	0	1	2	4:55 PM	0	0	0	0	0	4:55 PM	1	0	0	0	1
5:00 PM	0	0	0	1	1	5:00 PM	0	0	0	0	0	5:00 PM	5	0	0	1	6
5:05 PM	0	0	0	0	0	5:05 PM	0	0	0	0	0	5:05 PM	3	0	0	0	3
5:10 PM	0	2	0	2	4	5:10 PM	0	0	0	0	0	5:10 PM	1	0	0	0	1
5:15 PM	0	0	0	1	1	5:15 PM	0	0	0	0	0	5:15 PM	3	0	0	0	3
5:20 PM	0	2	0	0	2	5:20 PM	0	0	0	0	0	5:20 PM	3	0	0	0	3
5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0	5:25 PM	1	0	0	0	1
5:30 PM	0	0	0	1	1	5:30 PM	0	0	0	0	0	5:30 PM	3	0	0	0	3
5:35 PM	0	1	0	2	3	5:35 PM	0	0	0	0	0	5:35 PM	4	0	0	0	4
5:40 PM	0	1	0	1	2	5:40 PM	0	0	0	0	0	5:40 PM	3	0	0	0	3
5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0	5:45 PM	1	0	0	0	1
5:50 PM	0	1	0	0	1	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0
5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0	5:55 PM	1	0	0	0	1
Count Total	0	17	0	19	36	Count Total	0	0	0	0	0	Count Total	54	1	0	1	56
Peak Hour	0	7	0	11	18	Peak Hour	0	0	0	0	0	Peak Hour	34	0	0	1	35



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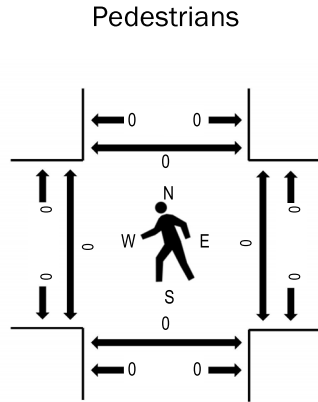
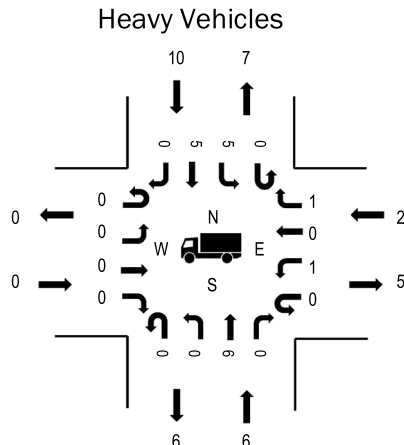
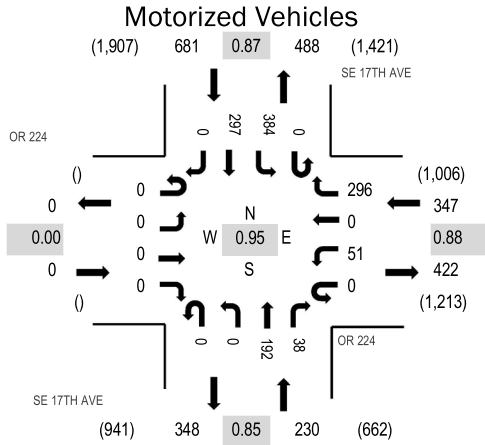
Location: 2 SE 17TH AVE & OR 224 PM

Date: Tuesday, February 7, 2023

Peak Hour: 04:10 PM - 05:10 PM

Peak 15-Minutes: 04:40 PM - 04:55 PM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	0.0%	0.00
WB	0.6%	0.88
NB	2.6%	0.85
SB	1.5%	0.87
All	1.4%	0.95

Traffic Counts - Motorized Vehicles

Interval Start Time	OR 224 Eastbound				OR 224 Westbound				SE 17TH AVE Northbound				SE 17TH AVE Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
3:00 PM	0	0	0	0	0	3	0	17	0	0	13	5	0	29	17	0	84	1,187
3:05 PM	0	0	0	0	0	4	0	16	0	0	24	4	0	33	22	0	103	1,195
3:10 PM	0	0	0	0	0	4	0	33	0	0	18	4	0	24	18	0	101	1,175
3:15 PM	0	0	0	0	0	2	0	23	0	0	16	5	0	27	15	0	88	1,174
3:20 PM	0	0	0	0	0	4	0	18	0	0	15	2	0	33	19	0	91	1,201
3:25 PM	0	0	0	0	0	5	0	26	0	0	19	2	0	28	20	0	100	1,213
3:30 PM	0	0	0	0	0	6	0	23	0	0	12	3	0	39	19	0	102	1,224
3:35 PM	0	0	0	0	0	5	0	31	0	0	16	4	0	30	23	0	109	1,210
3:40 PM	0	0	0	0	0	5	0	18	0	0	6	1	0	32	23	0	85	1,198
3:45 PM	0	0	0	0	0	5	0	42	0	0	16	1	0	31	17	0	112	1,231
3:50 PM	0	0	0	0	0	5	0	31	0	0	17	4	0	27	21	0	105	1,215
3:55 PM	0	0	0	0	0	1	0	26	0	0	22	4	0	32	22	0	107	1,226
4:00 PM	0	0	0	0	0	1	0	19	0	0	11	3	0	40	18	0	92	1,227
4:05 PM	0	0	0	0	0	6	0	15	0	0	13	2	0	22	25	0	83	1,225
4:10 PM	0	0	0	0	0	7	0	21	0	0	18	4	0	26	24	0	100	1,258
4:15 PM	0	0	0	0	0	2	0	29	0	0	23	4	0	29	28	0	115	1,243
4:20 PM	0	0	0	0	0	2	0	31	0	0	7	0	0	33	30	0	103	1,235
4:25 PM	0	0	0	0	0	5	0	15	0	0	24	3	0	36	28	0	111	1,239
4:30 PM	0	0	0	0	0	7	0	20	0	0	12	3	0	24	22	0	88	1,223
4:35 PM	0	0	0	0	0	2	0	23	0	0	26	4	0	26	16	0	97	1,239
4:40 PM	0	0	0	0	0	1	0	30	0	0	17	4	0	33	33	0	118	1,237
4:45 PM	0	0	0	0	0	1	0	15	0	0	19	0	0	40	21	0	96	1,236
4:50 PM	0	0	0	0	0	8	0	29	0	0	5	4	0	41	29	0	116	1,213
4:55 PM	0	0	0	0	0	7	0	28	0	0	12	6	0	31	24	0	108	1,175
5:00 PM	0	0	0	0	0	4	0	24	0	0	13	2	0	32	15	0	90	1,161
5:05 PM	0	0	0	0	0	5	0	31	0	0	16	4	0	33	27	0	116	
5:10 PM	0	0	0	0	0	3	0	22	0	0	16	2	0	14	28	0	85	
5:15 PM	0	0	0	0	0	3	0	30	0	0	13	6	0	32	23	0	107	

5:20 PM	0	0	0	0	0	3	0	32	0	0	11	4	0	27	30	0	107
5:25 PM	0	0	0	0	0	3	0	32	0	0	17	2	0	25	16	0	95
5:30 PM	0	0	0	0	0	1	0	19	0	0	14	3	0	36	31	0	104
5:35 PM	0	0	0	0	0	3	0	14	0	0	13	3	0	39	23	0	95
5:40 PM	0	0	0	0	0	2	0	34	0	0	18	3	0	38	22	0	117
5:45 PM	0	0	0	0	0	5	0	15	0	0	10	0	0	28	15	0	73
5:50 PM	0	0	0	0	0	3	0	8	0	0	12	5	0	31	19	0	78
5:55 PM	0	0	0	0	0	2	0	31	0	0	16	2	0	20	23	0	94
Count Total	0	0	0	0	0	135	0	871	0	0	550	112	0	1,101	806	0	3,575
Peak Hour	0	0	0	0	0	51	0	296	0	0	192	38	0	384	297	0	1,258

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
3:00 PM	0	2	2	1	5	3:00 PM	0	0	0	0	0	3:00 PM	0	0	0	0	0
3:05 PM	0	1	0	0	1	3:05 PM	0	0	0	1	1	3:05 PM	0	0	0	0	0
3:10 PM	0	0	1	0	1	3:10 PM	0	0	0	0	0	3:10 PM	0	0	0	0	0
3:15 PM	0	1	0	2	3	3:15 PM	0	0	0	0	0	3:15 PM	0	0	0	0	0
3:20 PM	0	2	1	2	5	3:20 PM	0	0	0	0	0	3:20 PM	0	0	0	0	0
3:25 PM	0	2	1	1	4	3:25 PM	0	0	0	0	0	3:25 PM	0	0	0	0	0
3:30 PM	0	0	1	2	3	3:30 PM	0	0	0	0	0	3:30 PM	0	0	0	0	0
3:35 PM	0	0	0	0	0	3:35 PM	0	0	0	0	0	3:35 PM	0	0	0	0	0
3:40 PM	0	0	0	1	1	3:40 PM	0	0	0	0	0	3:40 PM	0	0	0	0	0
3:45 PM	0	1	2	1	4	3:45 PM	0	0	0	0	0	3:45 PM	0	0	0	0	0
3:50 PM	0	0	1	0	1	3:50 PM	0	0	0	0	0	3:50 PM	0	0	0	0	0
3:55 PM	0	0	0	1	1	3:55 PM	0	0	0	0	0	3:55 PM	0	0	0	0	0
4:00 PM	0	1	0	0	1	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0
4:05 PM	0	2	2	1	5	4:05 PM	0	0	0	1	1	4:05 PM	0	0	0	0	0
4:10 PM	0	0	1	1	2	4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:20 PM	0	1	1	0	2	4:20 PM	0	0	0	0	0	4:20 PM	0	0	0	0	0
4:25 PM	0	1	0	1	2	4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0
4:30 PM	0	0	0	1	1	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0
4:35 PM	0	0	0	1	1	4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0
4:40 PM	0	1	0	1	2	4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	0	0
4:45 PM	0	2	0	1	3	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	0	0	0	1	1	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0
4:55 PM	0	1	0	2	3	4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0
5:00 PM	0	0	0	1	1	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:05 PM	0	0	0	0	0	5:05 PM	0	0	0	0	0	5:05 PM	0	0	0	0	0
5:10 PM	0	1	1	2	4	5:10 PM	0	0	0	0	0	5:10 PM	0	0	0	0	0
5:15 PM	0	0	0	1	1	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:20 PM	0	1	1	1	3	5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0
5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0
5:30 PM	0	1	0	1	2	5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0
5:35 PM	0	0	0	2	2	5:35 PM	0	0	0	2	2	5:35 PM	0	0	0	0	0
5:40 PM	0	0	1	1	2	5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	1	1	5:45 PM	0	0	0	0	0
5:50 PM	0	1	0	0	1	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0
5:55 PM	0	1	0	0	1	5:55 PM	0	0	0	1	1	5:55 PM	0	0	0	0	0
Count Total	0	23	16	30	69	Count Total	0	0	0	6	6	Count Total	0	0	0	0	0
Peak Hour	0	6	2	10	18	Peak Hour	0	0	0	0	0	Peak Hour	0	0	0	0	0



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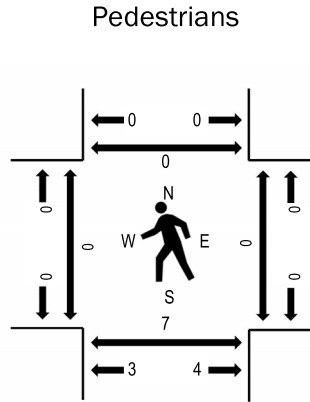
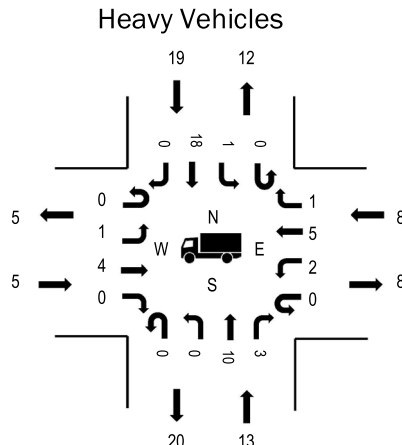
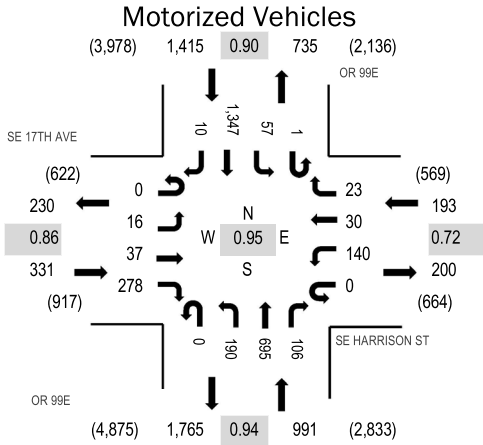
Location: 3 OR 99E & SE HARRISON ST PM

Date: Tuesday, February 7, 2023

Peak Hour: 03:50 PM - 04:50 PM

Peak 15-Minutes: 04:25 PM - 04:40 PM

Peak Hour



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	1.5%	0.86
WB	4.1%	0.72
NB	1.3%	0.94
SB	1.3%	0.90
All	1.5%	0.95

Traffic Counts - Motorized Vehicles

Interval Start Time	SE 17TH AVE Eastbound				SE HARRISON ST Westbound				OR 99E Northbound				OR 99E Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
3:00 PM	0	3	0	29	0	10	5	4	0	14	57	11	0	7	71	0	211	2,742
3:05 PM	0	0	2	17	0	10	6	2	0	16	53	9	0	7	116	0	238	2,776
3:10 PM	0	1	3	22	0	14	8	7	1	12	52	11	0	6	74	0	211	2,794
3:15 PM	0	0	3	13	0	13	1	7	0	16	65	9	0	17	112	0	256	2,816
3:20 PM	0	0	3	14	0	12	6	4	0	11	49	9	0	6	103	1	218	2,795
3:25 PM	0	0	2	18	0	8	5	6	0	11	46	8	0	10	91	1	206	2,807
3:30 PM	0	2	3	19	0	10	0	7	0	17	71	8	0	4	92	1	234	2,870
3:35 PM	0	0	6	25	0	12	1	2	0	12	58	8	0	5	106	0	235	2,861
3:40 PM	0	0	1	20	0	9	1	2	0	8	67	9	0	11	112	0	240	2,901
3:45 PM	0	2	4	18	0	11	2	0	0	9	48	8	0	5	112	1	220	2,900
3:50 PM	0	1	5	17	0	8	2	1	0	24	48	9	0	5	96	2	218	2,930
3:55 PM	0	1	2	21	0	9	0	1	0	17	55	4	1	9	134	1	255	2,921
4:00 PM	0	3	3	14	0	11	2	3	0	15	60	12	0	2	120	0	245	2,899
4:05 PM	0	1	4	24	0	12	1	4	0	10	52	12	0	4	132	0	256	2,888
4:10 PM	0	0	5	23	0	15	4	1	0	22	55	4	0	2	101	1	233	2,858
4:15 PM	0	1	1	24	0	13	3	0	0	17	60	9	0	5	102	0	235	2,866
4:20 PM	0	2	4	34	0	20	0	2	0	13	52	10	0	6	85	2	230	2,859
4:25 PM	0	0	1	24	0	14	8	2	0	14	66	4	0	4	131	1	269	2,843
4:30 PM	0	1	3	32	0	10	4	2	0	14	61	8	0	2	86	2	225	2,814
4:35 PM	0	1	0	12	0	6	4	3	0	13	60	8	0	9	159	0	275	2,804
4:40 PM	0	3	4	25	0	3	1	3	0	18	65	12	0	5	100	0	239	2,771
4:45 PM	0	2	5	28	0	19	1	1	0	13	61	14	0	4	101	1	250	2,759
4:50 PM	0	3	2	25	0	8	0	3	0	15	57	6	0	8	82	0	209	2,698
4:55 PM	0	0	5	21	0	8	0	0	0	10	48	8	0	9	121	3	233	2,699
5:00 PM	0	0	6	21	0	14	1	3	0	14	57	8	0	3	106	1	234	2,656
5:05 PM	0	1	3	16	0	7	2	0	0	13	51	6	0	9	117	1	226	
5:10 PM	0	3	6	24	0	12	2	6	0	13	68	13	0	3	90	1	241	
5:15 PM	0	1	2	23	0	16	0	2	0	13	48	5	0	8	108	2	228	

5:20 PM	0	3	2	29	0	10	3	1	0	19	49	6	0	3	86	3	214
5:25 PM	0	0	2	21	0	11	2	0	0	12	51	12	0	8	120	1	240
5:30 PM	0	1	10	20	0	8	2	0	0	17	54	11	0	5	86	1	215
5:35 PM	0	1	1	17	0	13	2	2	0	10	52	16	0	8	118	2	242
5:40 PM	0	3	3	24	0	11	4	2	0	14	46	14	0	6	99	1	227
5:45 PM	0	0	1	21	0	9	1	4	0	11	60	9	0	2	71	0	189
5:50 PM	0	1	8	14	0	8	3	0	0	17	51	9	0	10	89	0	210
5:55 PM	0	1	1	10	0	7	3	1	0	8	52	6	0	6	95	0	190
Count Total	0	42	116	759	0	391	90	88	1	502	2,005	325	1	223	3,724	30	8,297
Peak Hour	0	16	37	278	0	140	30	23	0	190	695	106	1	57	1,347	10	2,930

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
3:00 PM	0	5	1	3	9	3:00 PM	0	0	0	0	0	3:00 PM	0	2	0	0	2
3:05 PM	1	3	1	0	5	3:05 PM	0	0	3	0	3	3:05 PM	0	0	0	0	0
3:10 PM	0	3	0	0	3	3:10 PM	0	0	0	0	0	3:10 PM	0	2	0	0	2
3:15 PM	0	1	0	1	2	3:15 PM	0	0	0	0	0	3:15 PM	0	0	0	0	0
3:20 PM	1	2	0	2	5	3:20 PM	0	0	0	0	0	3:20 PM	0	3	0	0	3
3:25 PM	2	1	1	2	6	3:25 PM	0	0	0	0	0	3:25 PM	0	0	0	0	0
3:30 PM	1	2	0	4	7	3:30 PM	0	0	0	0	0	3:30 PM	0	1	1	0	2
3:35 PM	1	1	0	1	3	3:35 PM	0	0	0	0	0	3:35 PM	0	1	0	0	1
3:40 PM	1	2	0	6	9	3:40 PM	0	0	0	0	0	3:40 PM	0	0	0	0	0
3:45 PM	1	2	1	3	7	3:45 PM	0	0	0	0	0	3:45 PM	0	1	0	0	1
3:50 PM	0	3	1	0	4	3:50 PM	0	0	0	0	0	3:50 PM	0	2	0	0	2
3:55 PM	1	1	1	5	8	3:55 PM	0	0	0	0	0	3:55 PM	0	0	0	0	0
4:00 PM	1	0	1	1	3	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0
4:05 PM	0	1	0	2	3	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0
4:10 PM	0	0	0	3	3	4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0
4:15 PM	1	1	0	1	3	4:15 PM	0	0	0	0	0	4:15 PM	0	1	0	0	1
4:20 PM	0	0	0	0	0	4:20 PM	0	0	0	0	0	4:20 PM	0	1	0	0	1
4:25 PM	0	2	3	4	9	4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0
4:30 PM	1	1	0	0	2	4:30 PM	1	0	0	0	1	4:30 PM	0	3	0	0	3
4:35 PM	0	2	0	1	3	4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0
4:40 PM	1	1	0	2	4	4:40 PM	0	0	0	0	0	4:40 PM	0	1	0	0	1
4:45 PM	0	1	2	0	3	4:45 PM	0	0	0	0	0	4:45 PM	0	2	0	0	2
4:50 PM	1	1	0	0	2	4:50 PM	0	0	0	0	0	4:50 PM	0	4	0	0	4
4:55 PM	2	1	0	2	5	4:55 PM	0	0	0	0	0	4:55 PM	0	2	0	0	2
5:00 PM	0	1	1	1	3	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:05 PM	0	0	1	1	2	5:05 PM	0	0	0	0	0	5:05 PM	0	0	0	0	0
5:10 PM	1	2	1	0	4	5:10 PM	0	0	0	0	0	5:10 PM	0	1	0	0	1
5:15 PM	1	2	0	2	5	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:20 PM	1	1	0	0	2	5:20 PM	0	0	0	0	0	5:20 PM	0	2	0	0	2
5:25 PM	0	0	1	1	2	5:25 PM	0	0	0	0	0	5:25 PM	0	1	0	0	1
5:30 PM	1	1	0	1	3	5:30 PM	0	0	0	0	0	5:30 PM	0	1	1	0	2
5:35 PM	0	1	0	0	1	5:35 PM	0	0	0	0	0	5:35 PM	0	1	0	0	1
5:40 PM	1	0	0	0	1	5:40 PM	0	0	0	0	0	5:40 PM	0	2	0	0	2
5:45 PM	0	1	0	0	1	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
5:50 PM	0	0	1	0	1	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0
5:55 PM	0	3	0	4	7	5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0
Count Total	21	49	17	53	140	Count Total	1	0	3	0	4	Count Total	0	34	2	0	36
Peak Hour	5	13	8	19	45	Peak Hour	1	0	0	0	1	Peak Hour	0	10	0	0	10

Appendix C - Safety

Crash History Data

Left-Turn Lane Warrant Analysis

Preliminary Signal Warrant Analysis



OREGON.. DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
URBAN NON-SYSTEM CRASH LISTING

CITY OF MILWAUKIE, CLACKAMAS COUNTY

HARRISON ST at MCLOUGHLIN BLVD, City of Milwaukie, Clackamas County, 01/01/2016 to 12/31/2020

15 - 16 of 16 Crash records shown.

SER#	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	OFFERD	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
01691	N	N	N	N	#	05/18/2018	14	HARRISON ST	INTER	CROSS	N	N	N	CLR	S-OTHER	01	NONE	9	TURN-L										08
					E																								
					R																								
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Left-Turn Lane Warrant Analysis



Project: 23012 - Milwaukie Cottage Development
 Intersection: SE McBrod Avenue at SE 17th Avenue
 Date: 2/21/2023
 Scenario: 2024 Buildout

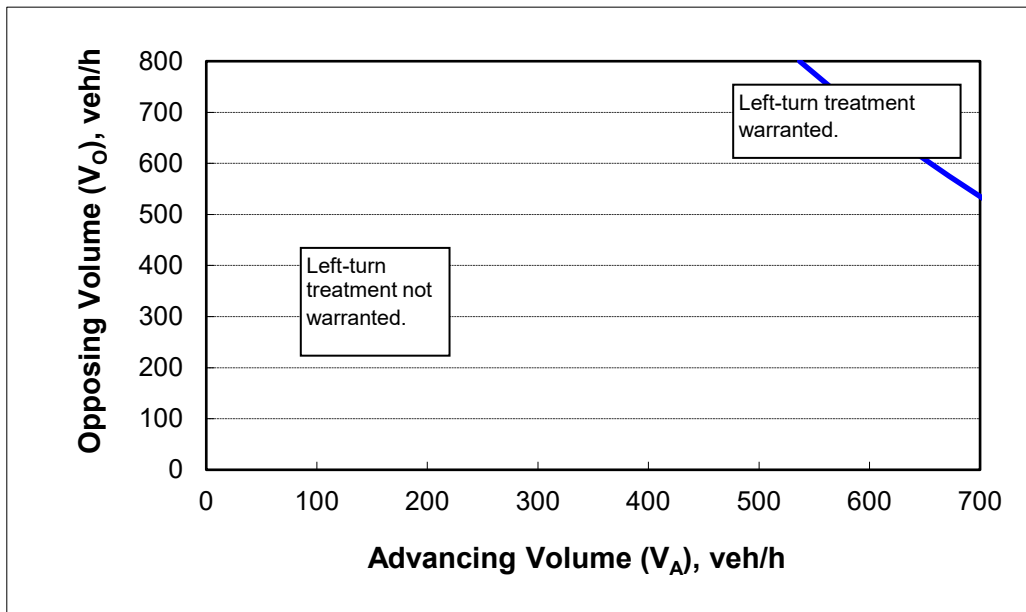
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	35
Left-turns in advancing volume (V_A), veh/hr:	11
Advancing volume (V_A), veh/h:	510
Opposing volume (V_O), veh/h:	679

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	605
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS (2-Lane Roadway)

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Traffic Signal Warrant Analysis



Project: 23102 - Milwaukie Cottages
 Date: 9/4/2023
 Scenario: Year 2024 Buildout Conditions - AM Peak Hour

Major Street:	SE McBrod Avenue	Minor Street:	Site Access
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	6	PM Peak Hour Volumes:	14

Warrant Used:

 X 100 percent of standard warrants used
 70 percent of standard warrants used due to 85th percentile speed in excess
 of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
Major St.	Minor St.	Warrants	Warrants	Warrants	Warrants
WARRANT 1, CONDITION A					
		100%	70%	100%	70%
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
WARRANT 1, CONDITION B					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
<i>Warrant 1</i>			
<i>Condition A: Minimum Vehicular Volume</i>			
Major Street	60	8,850	
Minor Street*	140	2,650	No
<i>Condition B: Interruption of Continuous Traffic</i>			
Major Street	60	13,300	
Minor Street*	140	1,350	No
<i>Combination Warrant</i>			
Major Street	60	10,640	
Minor Street*	140	2,120	No

* Minor street right-turning traffic volumes reduced by 25%

Traffic Signal Warrant Analysis



Project: 23102 - Milwaukie Cottages
 Date: 9/4/2023
 Scenario: Year 2024 Buildout Conditions - AM Peak Hour

Major Street:	SE 17th Avenue	Minor Street:	SE McBrod Avenue
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	1223	PM Peak Hour Volumes:	27

Warrant Used:

 X 100 percent of standard warrants used
 70 percent of standard warrants used due to 85th percentile speed in excess
 of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
Major St.	Minor St.	100% Warrants	70% Warrants	100% Warrants	70% Warrants
WARRANT 1, CONDITION A					
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
WARRANT 1, CONDITION B					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
<i>Warrant 1</i>			
<i>Condition A: Minimum Vehicular Volume</i>			
Major Street	12,230	8,850	
Minor Street*	270	2,650	No
<i>Condition B: Interruption of Continuous Traffic</i>			
Major Street	12,230	13,300	
Minor Street*	270	1,350	No
<i>Combination Warrant</i>			
Major Street	12,230	10,640	
Minor Street*	270	2,120	No

* Minor street right-turning traffic volumes reduced by 25%

Traffic Signal Warrant Analysis



Project: 23102 - Milwaukie Cottages
 Date: 9/4/2023
 Scenario: Year 2024 Buildout Conditions - PM Peak Hour

Major Street:	SE McBrod Avenue	Minor Street:	Site Access
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	20	PM Peak Hour Volumes:	9

Warrant Used:

 X 100 percent of standard warrants used
 70 percent of standard warrants used due to 85th percentile speed in excess
 of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
Major St.	Minor St.	Warrants	Warrants	Warrants	Warrants
WARRANT 1, CONDITION A					
		100%	70%	100%	70%
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
WARRANT 1, CONDITION B					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
<i>Warrant 1</i>			
<i>Condition A: Minimum Vehicular Volume</i>			
Major Street	200	8,850	
Minor Street*	90	2,650	No
<i>Condition B: Interruption of Continuous Traffic</i>			
Major Street	200	13,300	
Minor Street*	90	1,350	No
<i>Combination Warrant</i>			
Major Street	200	10,640	
Minor Street*	90	2,120	No

* Minor street right-turning traffic volumes reduced by 25%

Traffic Signal Warrant Analysis



Project: 23102 - Milwaukie Cottages
 Date: 9/4/2023
 Scenario: Year 2024 Buildout Conditions - PM Peak Hour

Major Street:	SE 17th Avenue	Minor Street:	SE McBrod Avenue
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	1193	PM Peak Hour Volumes:	19

Warrant Used:

 X 100 percent of standard warrants used
 70 percent of standard warrants used due to 85th percentile speed in excess
 of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
Major St.	Minor St.	100% Warrants	70% Warrants	100% Warrants	70% Warrants
WARRANT 1, CONDITION A					
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
WARRANT 1, CONDITION B					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
<i>Warrant 1</i>			
<i>Condition A: Minimum Vehicular Volume</i>			
Major Street	11,930	8,850	
Minor Street*	190	2,650	No
<i>Condition B: Interruption of Continuous Traffic</i>			
Major Street	11,930	13,300	
Minor Street*	190	1,350	No
<i>Combination Warrant</i>			
Major Street	11,930	10,640	
Minor Street*	190	2,120	No

* Minor street right-turning traffic volumes reduced by 25%

Appendix D - Operations

Definitions

Synchro Reports

Queuing Reports





Level of Service Definitions

Level of service is used to describe the quality of traffic flow. Levels of service A to C are considered good, and rural roads are usually designed for level of service C. Urban streets and signalized intersections are typically designed for level of service D. Level of service E is considered to be the limit of acceptable delay. For unsignalized intersections, level of service E is generally considered acceptable. Here is a more complete description of levels of service:

- *Level of service A:* Very low delay at intersections, with all traffic signal cycles clearing and no vehicles waiting through more than one signal cycle. On highways, low volume and high speeds, with speeds not restricted by other vehicles.
- *Level of service B:* Operating speeds beginning to be affected by other traffic; short traffic delays at intersections. Higher average intersection delay than for level of service A resulting from more vehicles stopping.
- *Level of service C:* Operating speeds and maneuverability closely controlled by other traffic; higher delays at intersections than for level of service B due to a significant number of vehicles stopping. Not all signal cycles clear the waiting vehicles. This is the recommended design standard for rural highways.
- *Level of service D:* Tolerable operating speeds; long traffic delays occur at intersections. The influence of congestion is noticeable. At traffic signals many vehicles stop, and the proportion of vehicles not stopping declines. The number of signal cycle failures, for which vehicles must wait through more than one signal cycle, are noticeable. This is typically the design level for urban signalized intersections.
- *Level of service E:* Restricted speeds, very long traffic delays at traffic signals, and traffic volumes near capacity. Flow is unstable so that any interruption, no matter how minor, will cause queues to form and service to deteriorate to level of service F. Traffic signal cycle failures are frequent occurrences. For unsignalized intersections, level of service E or better is generally considered acceptable.
- *Level of service F:* Extreme delays, resulting in long queues which may interfere with other traffic movements. There may be stoppages of long duration, and speeds may drop to zero. There may be frequent signal cycle failures. Level of service F will typically result when vehicle arrival rates are greater than capacity. It is considered unacceptable by most drivers.



Level of Service Criteria
For Signalized Intersections

Level of Service (LOS)	Control Delay per Vehicle (Seconds)
A	<10
B	10-20
C	20-35
D	35-55
E	55-80
F	>80

Level of Service Criteria
For Unsignalized Intersections

Level of Service (LOS)	Control Delay per Vehicle (Seconds)
A	<10
B	10-15
C	15-25
D	25-35
E	35-50
F	>50

Intersection												
Int Delay, s/veh	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	1	1	18	1	8	1	719	32	1	443	1
Future Vol, veh/h	1	1	1	18	1	8	1	719	32	1	443	1
Conflicting Peds, #/hr	0	0	0	0	0	0	4	0	0	0	0	4
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	39	39	39	3	3	3	1	1	1
Mvmt Flow	1	1	1	21	1	9	1	836	37	1	515	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1384	1397	520	1376	1379	855	520	0	0	873	0	0
Stage 1	522	522	-	857	857	-	-	-	-	-	-	-
Stage 2	862	875	-	519	522	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.49	6.89	6.59	4.13	-	-	4.11	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.49	5.89	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.49	5.89	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.851	4.351	3.651	2.227	-	-	2.209	-	-
Pot Cap-1 Maneuver	122	142	560	102	121	308	1041	-	-	777	-	-
Stage 1	542	534	-	305	327	-	-	-	-	-	-	-
Stage 2	353	370	-	478	475	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	117	141	558	101	120	308	1037	-	-	777	-	-
Mov Cap-2 Maneuver	117	141	-	101	120	-	-	-	-	-	-	-
Stage 1	539	531	-	304	326	-	-	-	-	-	-	-
Stage 2	340	369	-	475	472	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	26.4	42.4	0	0
HCM LOS	D	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1037	-	-	172	127	777	-	-
HCM Lane V/C Ratio	0.001	-	-	0.02	0.247	0.001	-	-
HCM Control Delay (s)	8.5	0	-	26.4	42.4	9.6	0	-
HCM Lane LOS	A	A	-	D	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.9	0	-	-

HCM 6th Signalized Intersection Summary

3: OR-224 & SE 17th Ave

02/23/2023



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	41	560	278	21	275	188
Future Volume (veh/h)	41	560	278	21	275	188
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	1841	1870	1870	1841	1841
Adj Flow Rate, veh/h	48	477	323	0	320	219
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	4	4	2	2	4	4
Cap, veh/h	343	719	459		465	1120
Arrive On Green	0.20	0.20	0.25	0.00	0.27	0.61
Sat Flow, veh/h	1753	1560	1870	1585	1753	1841
Grp Volume(v), veh/h	48	477	323	0	320	219
Grp Sat Flow(s),veh/h/ln	1753	1560	1870	1585	1753	1841
Q Serve(g_s), s	0.9	0.0	6.4	0.0	6.7	2.2
Cycle Q Clear(g_c), s	0.9	0.0	6.4	0.0	6.7	2.2
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	343	719	459		465	1120
V/C Ratio(X)	0.14	0.66	0.70		0.69	0.20
Avail Cap(c_a), veh/h	817	1140	1330		1289	2843
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	13.6	8.5	14.0	0.0	13.5	3.6
Incr Delay (d2), s/veh	0.1	0.8	1.5	0.0	1.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.4	2.3	0.0	2.2	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.7	9.3	15.5	0.0	14.8	3.6
LnGrp LOS	B	A	B		B	A
Approach Vol, veh/h	525		323			539
Approach Delay, s/veh	9.7		15.5			10.3
Approach LOS	A		B			B
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	14.8	14.0			28.8	12.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0
Max Green Setting (Gmax), s	30.0	29.0			63.0	19.0
Max Q Clear Time (g_c+I1), s	8.7	8.4			4.2	2.9
Green Ext Time (p_c), s	2.4	1.4			1.0	4.3

Intersection Summary

HCM 6th Ctrl Delay	11.3
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

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

HCM 6th Signalized Intersection Summary

4: OR-99E & SE 17th Ave

02/23/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↔		↖	↕		↗	↕	
Traffic Volume (veh/h)	17	47	166	71	28	34	325	1282	93	97	731	10
Future Volume (veh/h)	17	47	166	71	28	34	325	1282	93	97	731	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	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	1870	1870	1870	1811	1811	1811	1870	1870	1870	1856	1856	1856
Adj Flow Rate, veh/h	18	48	89	61	46	20	335	1322	91	100	754	10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	6	6	6	2	2	2	3	3	3
Cap, veh/h	42	113	473	113	78	34	385	2178	150	126	1783	24
Arrive On Green	0.08	0.08	0.08	0.07	0.07	0.07	0.22	0.65	0.65	0.07	0.50	0.50
Sat Flow, veh/h	503	1342	1551	1725	1186	516	1781	3373	232	1767	3562	47
Grp Volume(v), veh/h	66	0	89	61	0	66	335	695	718	100	373	391
Grp Sat Flow(s),veh/h/ln	1845	0	1551	1725	0	1701	1781	1777	1828	1767	1763	1847
Q Serve(g_s), s	4.1	0.0	5.1	4.1	0.0	4.5	21.8	27.3	27.5	6.7	16.1	16.1
Cycle Q Clear(g_c), s	4.1	0.0	5.1	4.1	0.0	4.5	21.8	27.3	27.5	6.7	16.1	16.1
Prop In Lane	0.27		1.00	1.00		0.30	1.00		0.13	1.00		0.03
Lane Grp Cap(c), veh/h	155	0	473	113	0	112	385	1147	1180	126	882	925
V/C Ratio(X)	0.43	0.00	0.19	0.54	0.00	0.59	0.87	0.61	0.61	0.79	0.42	0.42
Avail Cap(c_a), veh/h	461	0	731	158	0	156	549	1147	1180	191	882	925
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.2	0.0	31.2	54.3	0.0	54.5	45.4	12.4	12.4	54.9	19.0	19.0
Incr Delay (d2), s/veh	1.4	0.0	0.1	2.9	0.0	3.6	9.3	2.4	2.3	9.9	1.5	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	1.9	0.0	1.9	1.9	0.0	2.0	10.6	10.9	11.3	3.3	6.9	7.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.6	0.0	31.3	57.2	0.0	58.1	54.7	14.8	14.8	64.7	20.5	20.4
LnGrp LOS	D	A	C	E	A	E	D	B	B	E	C	C
Approach Vol, veh/h		155			127			1748			864	
Approach Delay, s/veh		40.8			57.7			22.4			25.6	
Approach LOS		D			E			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.6	81.5		14.1	29.9	64.1		11.9				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	13.0	50.0		30.0	37.0	26.0		11.0				
Max Q Clear Time (g_c+I1), s	8.7	29.5		7.1	23.8	18.1		6.5				
Green Ext Time (p_c), s	0.2	8.8		0.9	2.2	2.5		0.2				

Intersection Summary

HCM 6th Ctrl Delay	25.9
HCM 6th LOS	C

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved volume balancing among the lanes for turning movement.
- User approved changes to right turn type.

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	1	1	14	1	3	3	482	7	2	662	1
Future Vol, veh/h	2	1	1	14	1	3	3	482	7	2	662	1
Conflicting Peds, #/hr	1	0	0	0	0	1	9	0	0	0	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	0	0	0	1	1	1	2	2	2
Mvmt Flow	2	1	1	15	1	3	3	518	8	2	712	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1257	1258	722	1246	1254	523	722	0	0	526	0	0
Stage 1	726	726	-	528	528	-	-	-	-	-	-	-
Stage 2	531	532	-	718	726	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.11	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.209	-	-	2.218	-	-
Pot Cap-1 Maneuver	149	172	430	152	173	558	885	-	-	1041	-	-
Stage 1	419	433	-	538	531	-	-	-	-	-	-	-
Stage 2	536	529	-	423	433	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	145	169	426	150	170	557	877	-	-	1041	-	-
Mov Cap-2 Maneuver	145	169	-	150	170	-	-	-	-	-	-	-
Stage 1	413	428	-	535	528	-	-	-	-	-	-	-
Stage 2	529	526	-	420	428	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB			
HCM Control Delay, s	25.4		28.6		0.1		0			
HCM LOS	D		D							

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	877	-	-	181	172	1041	-	-
HCM Lane V/C Ratio	0.004	-	-	0.024	0.113	0.002	-	-
HCM Control Delay (s)	9.1	0	-	25.4	28.6	8.5	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.4	0	-	-

HCM 6th Signalized Intersection Summary

3: SE 17th Ave

02/23/2023



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	62	358	192	38	384	297
Future Volume (veh/h)	62	358	192	38	384	297
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	1885	1885	1856	1856	1870	1870
Adj Flow Rate, veh/h	65	219	202	0	404	313
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	3	3	2	2
Cap, veh/h	317	798	422		575	1200
Arrive On Green	0.18	0.18	0.23	0.00	0.32	0.64
Sat Flow, veh/h	1795	1598	1856	1572	1781	1870
Grp Volume(v), veh/h	65	219	202	0	404	313
Grp Sat Flow(s),veh/h/ln	1795	1598	1856	1572	1781	1870
Q Serve(g_s), s	1.4	0.0	4.1	0.0	8.7	3.2
Cycle Q Clear(g_c), s	1.4	0.0	4.1	0.0	8.7	3.2
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	317	798	422		575	1200
V/C Ratio(X)	0.21	0.27	0.48		0.70	0.26
Avail Cap(c_a), veh/h	449	916	1056		1703	3022
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	15.5	6.4	14.7	0.0	13.0	3.4
Incr Delay (d2), s/veh	0.2	0.1	0.6	0.0	1.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.8	1.5	0.0	2.9	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	15.7	6.5	15.3	0.0	14.2	3.5
LnGrp LOS	B	A	B		B	A
Approach Vol, veh/h	284		202			717
Approach Delay, s/veh	8.6		15.3			9.5
Approach LOS	A		B			A
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	18.2	14.0			32.2	11.8
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0
Max Green Setting (Gmax), s	42.0	25.0			71.0	11.0
Max Q Clear Time (g_c+I1), s	10.7	6.1			5.2	3.4
Green Ext Time (p_c), s	3.6	0.8			1.6	1.3

Intersection Summary

HCM 6th Ctrl Delay	10.3
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

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

HCM 6th Signalized Intersection Summary

4: OR-99E & SE 17th Ave

02/23/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↔		↖	↕		↗	↕	
Traffic Volume (veh/h)	16	37	278	141	30	23	230	840	128	69	1628	12
Future Volume (veh/h)	16	37	278	141	30	23	230	840	128	69	1628	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	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	1870	1870	1870	1841	1841	1841	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	17	39	209	94	107	8	242	884	130	73	1714	13
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	4	4	4	1	1	1	1	1	1
Cap, veh/h	56	128	393	139	134	10	272	1989	292	94	1952	15
Arrive On Green	0.10	0.10	0.10	0.08	0.08	0.08	0.15	0.63	0.63	0.05	0.54	0.54
Sat Flow, veh/h	559	1283	1530	1753	1688	126	1795	3133	461	1795	3644	28
Grp Volume(v), veh/h	56	0	209	94	0	115	242	505	509	73	842	885
Grp Sat Flow(s),veh/h/ln	1842	0	1530	1753	0	1814	1795	1791	1802	1795	1791	1880
Q Serve(g_s), s	3.4	0.0	12.0	6.3	0.0	7.5	15.9	17.2	17.2	4.8	49.4	49.6
Cycle Q Clear(g_c), s	3.4	0.0	12.0	6.3	0.0	7.5	15.9	17.2	17.2	4.8	49.4	49.6
Prop In Lane	0.30		1.00	1.00		0.07	1.00		0.26	1.00		0.01
Lane Grp Cap(c), veh/h	184	0	393	139	0	144	272	1137	1144	94	959	1007
V/C Ratio(X)	0.30	0.00	0.53	0.68	0.00	0.80	0.89	0.44	0.44	0.77	0.88	0.88
Avail Cap(c_a), veh/h	184	0	393	146	0	151	299	1137	1144	150	959	1007
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)	0.99	0.00	0.99	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.1	0.0	38.9	53.7	0.0	54.3	49.9	11.1	11.1	56.1	24.4	24.4
Incr Delay (d2), s/veh	0.7	0.0	1.1	10.1	0.0	23.6	24.2	1.3	1.3	9.6	11.2	10.8
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	0.0	5.4	3.1	0.0	4.3	8.9	6.9	7.0	2.4	23.0	24.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.8	0.0	40.0	63.8	0.0	77.9	74.1	12.4	12.4	65.8	35.6	35.3
LnGrp LOS	D	A	D	E	A	E	E	B	B	E	D	D
Approach Vol, veh/h		265			209			1256			1800	
Approach Delay, s/veh		42.3			71.6			24.3			36.7	
Approach LOS		D			E			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.3	80.2		16.0	22.2	68.3		13.5				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	10.0	72.0		12.0	20.0	62.0		10.0				
Max Q Clear Time (g_c+I1), s	6.8	19.2		14.0	17.9	51.6		9.5				
Green Ext Time (p_c), s	0.1	6.7		0.0	0.3	7.2		0.1				

Intersection Summary

HCM 6th Ctrl Delay	34.7
HCM 6th LOS	C

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved volume balancing among the lanes for turning movement.
- User approved changes to right turn type.

Intersection												
Int Delay, s/veh	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	1	1	18	1	8	1	733	33	1	452	1
Future Vol, veh/h	1	1	1	18	1	8	1	733	33	1	452	1
Conflicting Peds, #/hr	0	0	0	0	0	0	4	0	0	0	0	4
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	39	39	39	3	3	3	1	1	1
Mvmt Flow	1	1	1	21	1	9	1	852	38	1	526	1

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1411	1425	531	1403	1406	871	531	0	0	890	0	0
Stage 1	533	533	-	873	873	-	-	-	-	-	-	-
Stage 2	878	892	-	530	533	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.49	6.89	6.59	4.13	-	-	4.11	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.49	5.89	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.49	5.89	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.851	4.351	3.651	2.227	-	-	2.209	-	-
Pot Cap-1 Maneuver	117	137	552	97	117	301	1031	-	-	766	-	-
Stage 1	534	528	-	298	321	-	-	-	-	-	-	-
Stage 2	345	363	-	471	469	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	112	136	550	96	116	301	1027	-	-	766	-	-
Mov Cap-2 Maneuver	112	136	-	96	116	-	-	-	-	-	-	-
Stage 1	531	525	-	297	320	-	-	-	-	-	-	-
Stage 2	332	362	-	468	466	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	27.2	44.9	0	0
HCM LOS	D	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1027	-	-	166	121	766	-	-
HCM Lane V/C Ratio	0.001	-	-	0.021	0.259	0.002	-	-
HCM Control Delay (s)	8.5	0	-	27.2	44.9	9.7	0	-
HCM Lane LOS	A	A	-	D	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	1	0	-	-

HCM 6th Signalized Intersection Summary

3: SE 17th Ave & OR-224

02/23/2023



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	42	571	284	21	281	192
Future Volume (veh/h)	42	571	284	21	281	192
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	1841	1870	1870	1841	1841
Adj Flow Rate, veh/h	49	490	330	0	327	223
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	4	4	2	2	4	4
Cap, veh/h	336	728	458		482	1134
Arrive On Green	0.19	0.19	0.24	0.00	0.27	0.62
Sat Flow, veh/h	1753	1560	1870	1585	1753	1841
Grp Volume(v), veh/h	49	490	330	0	327	223
Grp Sat Flow(s),veh/h/ln	1753	1560	1870	1585	1753	1841
Q Serve(g_s), s	1.0	0.0	6.7	0.0	6.9	2.2
Cycle Q Clear(g_c), s	1.0	0.0	6.7	0.0	6.9	2.2
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	336	728	458		482	1134
V/C Ratio(X)	0.15	0.67	0.72		0.68	0.20
Avail Cap(c_a), veh/h	337	729	1304		1728	3274
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	14.0	8.6	14.4	0.0	13.4	3.5
Incr Delay (d2), s/veh	0.1	2.3	1.6	0.0	1.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.2	2.5	0.0	2.3	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.1	10.9	16.0	0.0	14.7	3.6
LnGrp LOS	B	B	B		B	A
Approach Vol, veh/h	539		330			550
Approach Delay, s/veh	11.2		16.0			10.2
Approach LOS	B		B			B
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	15.4	14.2			29.6	12.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0
Max Green Setting (Gmax), s	41.0	29.0			74.0	8.0
Max Q Clear Time (g_c+I1), s	8.9	8.7			4.2	3.0
Green Ext Time (p_c), s	2.8	1.5			1.1	1.7

Intersection Summary

HCM 6th Ctrl Delay	11.9
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

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

HCM 6th Signalized Intersection Summary
 4: OR-99E & SE 17th Ave

02/23/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↔		↖	↕		↖	↕	
Traffic Volume (veh/h)	17	48	169	72	29	35	332	1295	95	99	738	10
Future Volume (veh/h)	17	48	169	72	29	35	332	1295	95	99	738	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	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	1870	1870	1870	1811	1811	1811	1870	1870	1870	1856	1856	1856
Adj Flow Rate, veh/h	18	49	92	62	46	21	342	1335	93	102	761	10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	6	6	6	2	2	2	3	3	3
Cap, veh/h	33	91	454	113	77	35	394	2228	155	128	1826	24
Arrive On Green	0.07	0.07	0.07	0.07	0.07	0.07	0.22	0.66	0.66	0.07	0.51	0.51
Sat Flow, veh/h	496	1350	1543	1725	1166	532	1781	3370	234	1767	3563	47
Grp Volume(v), veh/h	67	0	92	62	0	67	342	702	726	102	376	395
Grp Sat Flow(s),veh/h/ln	1846	0	1543	1725	0	1698	1781	1777	1828	1767	1763	1847
Q Serve(g_s), s	4.2	0.0	5.4	4.2	0.0	4.6	22.2	26.6	26.8	6.8	15.9	15.9
Cycle Q Clear(g_c), s	4.2	0.0	5.4	4.2	0.0	4.6	22.2	26.6	26.8	6.8	15.9	15.9
Prop In Lane	0.27		1.00	1.00		0.31	1.00		0.13	1.00		0.03
Lane Grp Cap(c), veh/h	124	0	454	113	0	112	394	1175	1208	128	903	946
V/C Ratio(X)	0.54	0.00	0.20	0.55	0.00	0.60	0.87	0.60	0.60	0.80	0.42	0.42
Avail Cap(c_a), veh/h	138	0	467	158	0	156	579	1175	1208	191	903	946
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)	0.99	0.00	0.99	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.2	0.0	32.3	54.3	0.0	54.5	45.0	11.4	11.4	54.8	18.1	18.1
Incr Delay (d2), s/veh	2.7	0.0	0.2	3.0	0.0	3.8	8.2	2.2	2.2	10.6	1.4	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	2.0	0.0	2.0	1.9	0.0	2.1	10.7	10.5	10.9	3.4	6.8	7.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.9	0.0	32.5	57.3	0.0	58.3	53.2	13.6	13.6	65.4	19.6	19.5
LnGrp LOS	E	A	C	E	A	E	D	B	B	E	B	B
Approach Vol, veh/h		159			129			1770				873
Approach Delay, s/veh		42.7			57.8			21.3				24.9
Approach LOS		D			E			C				C
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.7	83.3		12.1	30.6	65.5		11.9				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	13.0	71.0		9.0	39.0	45.0		11.0				
Max Q Clear Time (g_c+I1), s	8.8	28.8		7.4	24.2	17.9		6.6				
Green Ext Time (p_c), s	0.2	11.4		0.1	2.4	4.2		0.2				

Intersection Summary

HCM 6th Ctrl Delay	25.1
HCM 6th LOS	C

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved volume balancing among the lanes for turning movement.
- User approved changes to right turn type.

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	1	1	14	1	3	3	492	7	2	675	1
Future Vol, veh/h	2	1	1	14	1	3	3	492	7	2	675	1
Conflicting Peds, #/hr	1	0	0	0	0	1	9	0	0	0	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	0	0	0	1	1	1	2	2	2
Mvmt Flow	2	1	1	15	1	3	3	529	8	2	726	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1282	1283	736	1271	1279	534	736	0	0	537	0	0
Stage 1	740	740	-	539	539	-	-	-	-	-	-	-
Stage 2	542	543	-	732	740	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.11	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.209	-	-	2.218	-	-
Pot Cap-1 Maneuver	144	167	422	146	167	550	874	-	-	1031	-	-
Stage 1	412	426	-	530	525	-	-	-	-	-	-	-
Stage 2	528	523	-	416	426	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	140	164	418	144	164	549	867	-	-	1031	-	-
Mov Cap-2 Maneuver	140	164	-	144	164	-	-	-	-	-	-	-
Stage 1	406	421	-	527	522	-	-	-	-	-	-	-
Stage 2	521	520	-	413	421	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB			
HCM Control Delay, s	26		29.7		0.1		0			
HCM LOS	D		D							

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	867	-	-	176	165	1031	-	-
HCM Lane V/C Ratio	0.004	-	-	0.024	0.117	0.002	-	-
HCM Control Delay (s)	9.2	0	-	26	29.7	8.5	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.4	0	-	-

HCM 6th Signalized Intersection Summary

3: SE 17th Ave

02/23/2023



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	63	365	196	39	392	303
Future Volume (veh/h)	63	365	196	39	392	303
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	1885	1885	1856	1856	1870	1870
Adj Flow Rate, veh/h	66	226	206	0	413	319
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	3	3	2	2
Cap, veh/h	315	805	418		585	1205
Arrive On Green	0.18	0.18	0.23	0.00	0.33	0.64
Sat Flow, veh/h	1795	1598	1856	1572	1781	1870
Grp Volume(v), veh/h	66	226	206	0	413	319
Grp Sat Flow(s),veh/h/ln	1795	1598	1856	1572	1781	1870
Q Serve(g_s), s	1.4	0.0	4.3	0.0	9.0	3.2
Cycle Q Clear(g_c), s	1.4	0.0	4.3	0.0	9.0	3.2
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	315	805	418		585	1205
V/C Ratio(X)	0.21	0.28	0.49		0.71	0.26
Avail Cap(c_a), veh/h	445	921	1046		1687	2995
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	15.6	6.4	15.0	0.0	13.0	3.4
Incr Delay (d2), s/veh	0.2	0.1	0.7	0.0	1.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.9	1.6	0.0	3.0	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	15.9	6.5	15.6	0.0	14.2	3.5
LnGrp LOS	B	A	B		B	A
Approach Vol, veh/h	292		206			732
Approach Delay, s/veh	8.6		15.6			9.5
Approach LOS	A		B			A
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	18.6	14.0			32.6	11.8
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0
Max Green Setting (Gmax), s	42.0	25.0			71.0	11.0
Max Q Clear Time (g_c+I1), s	11.0	6.3			5.2	3.4
Green Ext Time (p_c), s	3.7	0.8			1.6	1.3

Intersection Summary

HCM 6th Ctrl Delay	10.3
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

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

HCM 6th Signalized Intersection Summary
 4: OR-99E & SE 17th Ave

02/23/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↔		↖	↕		↖	↕	
Traffic Volume (veh/h)	16	38	284	144	31	23	235	848	131	70	1644	12
Future Volume (veh/h)	16	38	284	144	31	23	235	848	131	70	1644	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	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	1870	1870	1870	1841	1841	1841	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	17	40	215	97	111	8	247	893	133	74	1731	13
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	4	4	4	1	1	1	1	1	1
Cap, veh/h	46	108	373	143	138	10	279	2029	302	95	1993	15
Arrive On Green	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.65	0.65	0.05	0.55	0.55
Sat Flow, veh/h	550	1293	1523	1753	1693	122	1795	3127	466	1795	3644	27
Grp Volume(v), veh/h	57	0	215	97	0	119	247	511	515	74	850	894
Grp Sat Flow(s),veh/h/ln	1843	0	1523	1753	0	1815	1795	1791	1801	1795	1791	1880
Q Serve(g_s), s	3.5	0.0	10.0	6.5	0.0	7.7	16.2	16.8	16.8	4.9	49.1	49.3
Cycle Q Clear(g_c), s	3.5	0.0	10.0	6.5	0.0	7.7	16.2	16.8	16.8	4.9	49.1	49.3
Prop In Lane	0.30		1.00	1.00		0.07	1.00		0.26	1.00		0.01
Lane Grp Cap(c), veh/h	154	0	373	143	0	148	279	1162	1169	95	979	1028
V/C Ratio(X)	0.37	0.00	0.58	0.68	0.00	0.81	0.89	0.44	0.44	0.78	0.87	0.87
Avail Cap(c_a), veh/h	154	0	373	146	0	151	314	1162	1169	150	979	1028
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)	0.99	0.00	0.99	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.0	0.0	40.5	53.6	0.0	54.2	49.7	10.4	10.4	56.1	23.5	23.5
Incr Delay (d2), s/veh	1.1	0.0	1.9	10.9	0.0	25.3	22.5	1.2	1.2	9.5	10.3	10.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	5.8	3.3	0.0	4.5	9.0	6.7	6.8	2.5	22.6	23.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.1	0.0	42.3	64.5	0.0	79.5	72.1	11.6	11.6	65.6	33.8	33.5
LnGrp LOS	D	A	D	E	A	E	E	B	B	E	C	C
Approach Vol, veh/h		272			216			1273			1818	
Approach Delay, s/veh		44.6			72.7			23.3			34.9	
Approach LOS		D			E			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.4	81.9		14.0	22.6	69.6		13.8				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	10.0	74.0		10.0	21.0	63.0		10.0				
Max Q Clear Time (g_c+I1), s	6.9	18.8		12.0	18.2	51.3		9.7				
Green Ext Time (p_c), s	0.1	6.8		0.0	0.5	7.9		0.0				

Intersection Summary

HCM 6th Ctrl Delay	33.8
HCM 6th LOS	C

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved volume balancing among the lanes for turning movement.
- User approved changes to right turn type.

Intersection						
Int Delay, s/veh	5.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	
Traffic Vol, veh/h	1	1	1	5	14	1
Future Vol, veh/h	1	1	1	5	14	1
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	-
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	1	1	1	5	15	1

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	6	0	-	0	7
Stage 1	-	-	-	-	4
Stage 2	-	-	-	-	3
Critical Hdwy	4.12	-	-	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	2.218	-	-	-	3.518
Pot Cap-1 Maneuver	1615	-	-	-	1014
Stage 1	-	-	-	-	1019
Stage 2	-	-	-	-	1020
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1615	-	-	-	1013
Mov Cap-2 Maneuver	-	-	-	-	1013
Stage 1	-	-	-	-	1018
Stage 2	-	-	-	-	1020

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1615	-	-	-	1017
HCM Lane V/C Ratio	0.001	-	-	-	0.016
HCM Control Delay (s)	7.2	0	-	-	8.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection												
Int Delay, s/veh	1.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	3	9	18	1	8	3	733	33	1	452	1
Future Vol, veh/h	3	3	9	18	1	8	3	733	33	1	452	1
Conflicting Peds, #/hr	0	0	0	0	0	0	4	0	0	0	0	4
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	39	39	39	3	3	3	1	1	1
Mvmt Flow	3	3	10	21	1	9	3	852	38	1	526	1

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1415	1429	531	1412	1410	871	531	0	0	890	0	0
Stage 1	533	533	-	877	877	-	-	-	-	-	-	-
Stage 2	882	896	-	535	533	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.49	6.89	6.59	4.13	-	-	4.11	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.49	5.89	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.49	5.89	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.851	4.351	3.651	2.227	-	-	2.209	-	-
Pot Cap-1 Maneuver	116	136	552	96	116	301	1031	-	-	766	-	-
Stage 1	534	528	-	296	320	-	-	-	-	-	-	-
Stage 2	344	362	-	468	469	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	110	134	550	92	115	301	1027	-	-	766	-	-
Mov Cap-2 Maneuver	110	134	-	92	115	-	-	-	-	-	-	-
Stage 1	529	525	-	294	318	-	-	-	-	-	-	-
Stage 2	330	360	-	455	466	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.2	46.7	0	0
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1027	-	-	227	117	766	-	-
HCM Lane V/C Ratio	0.003	-	-	0.077	0.268	0.002	-	-
HCM Control Delay (s)	8.5	0	-	22.2	46.7	9.7	0	-
HCM Lane LOS	A	A	-	C	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	1	0	-	-

HCM 6th Signalized Intersection Summary

3: SE 17th Ave & OR-224

02/23/2023



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	42	573	285	21	285	196
Future Volume (veh/h)	42	573	285	21	285	196
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	1841	1870	1870	1841	1841
Adj Flow Rate, veh/h	49	492	331	0	331	228
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	4	4	2	2	4	4
Cap, veh/h	335	730	458		486	1138
Arrive On Green	0.19	0.19	0.25	0.00	0.28	0.62
Sat Flow, veh/h	1753	1560	1870	1585	1753	1841
Grp Volume(v), veh/h	49	492	331	0	331	228
Grp Sat Flow(s),veh/h/ln	1753	1560	1870	1585	1753	1841
Q Serve(g_s), s	1.0	0.0	6.8	0.0	7.0	2.3
Cycle Q Clear(g_c), s	1.0	0.0	6.8	0.0	7.0	2.3
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	335	730	458		486	1138
V/C Ratio(X)	0.15	0.67	0.72		0.68	0.20
Avail Cap(c_a), veh/h	335	731	1296		1718	3255
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	14.1	8.6	14.5	0.0	13.5	3.5
Incr Delay (d2), s/veh	0.1	2.3	1.6	0.0	1.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.2	2.5	0.0	2.3	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.2	10.9	16.1	0.0	14.7	3.5
LnGrp LOS	B	B	B		B	A
Approach Vol, veh/h	541		331			559
Approach Delay, s/veh	11.2		16.1			10.2
Approach LOS	B		B			B
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	15.6	14.3			29.9	12.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0
Max Green Setting (Gmax), s	41.0	29.0			74.0	8.0
Max Q Clear Time (g_c+I1), s	9.0	8.8			4.3	3.0
Green Ext Time (p_c), s	2.8	1.5			1.1	1.7

Intersection Summary

HCM 6th Ctrl Delay	11.9
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

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

HCM 6th Signalized Intersection Summary
 4: OR-99E & SE 17th Ave

02/23/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↘	↙		↖	↗		↘	↙	
Traffic Volume (veh/h)	17	48	173	72	29	35	333	1295	95	99	738	10
Future Volume (veh/h)	17	48	173	72	29	35	333	1295	95	99	738	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	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	1870	1870	1870	1811	1811	1811	1870	1870	1870	1856	1856	1856
Adj Flow Rate, veh/h	18	49	96	62	46	21	343	1335	93	102	761	10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	6	6	6	2	2	2	3	3	3
Cap, veh/h	33	91	455	113	77	35	395	2228	155	128	1823	24
Arrive On Green	0.07	0.07	0.07	0.07	0.07	0.07	0.22	0.66	0.66	0.07	0.51	0.51
Sat Flow, veh/h	496	1350	1543	1725	1166	532	1781	3370	234	1767	3563	47
Grp Volume(v), veh/h	67	0	96	62	0	67	343	702	726	102	376	395
Grp Sat Flow(s),veh/h/ln	1846	0	1543	1725	0	1698	1781	1777	1828	1767	1763	1847
Q Serve(g_s), s	4.2	0.0	5.7	4.2	0.0	4.6	22.3	26.6	26.8	6.8	15.9	15.9
Cycle Q Clear(g_c), s	4.2	0.0	5.7	4.2	0.0	4.6	22.3	26.6	26.8	6.8	15.9	15.9
Prop In Lane	0.27		1.00	1.00		0.31	1.00		0.13	1.00		0.03
Lane Grp Cap(c), veh/h	124	0	455	113	0	112	395	1175	1208	128	902	945
V/C Ratio(X)	0.54	0.00	0.21	0.55	0.00	0.60	0.87	0.60	0.60	0.80	0.42	0.42
Avail Cap(c_a), veh/h	138	0	467	158	0	156	579	1175	1208	191	902	945
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)	0.99	0.00	0.99	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.2	0.0	32.3	54.3	0.0	54.5	45.0	11.4	11.4	54.8	18.2	18.2
Incr Delay (d2), s/veh	2.7	0.0	0.2	3.0	0.0	3.8	8.3	2.2	2.2	10.6	1.4	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	2.0	0.0	2.1	1.9	0.0	2.1	10.7	10.5	10.9	3.4	6.8	7.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.8	0.0	32.5	57.3	0.0	58.3	53.3	13.6	13.6	65.4	19.6	19.5
LnGrp LOS	E	A	C	E	A	E	D	B	B	E	B	B
Approach Vol, veh/h		163			129			1771			873	
Approach Delay, s/veh		42.5			57.8			21.3			24.9	
Approach LOS		D			E			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.7	83.3		12.1	30.6	65.4		11.9				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	13.0	71.0		9.0	39.0	45.0		11.0				
Max Q Clear Time (g_c+I1), s	8.8	28.8		7.7	24.3	17.9		6.6				
Green Ext Time (p_c), s	0.2	11.4		0.1	2.4	4.2		0.2				

Intersection Summary

HCM 6th Ctrl Delay	25.2
HCM 6th LOS	C

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved volume balancing among the lanes for turning movement.
- User approved changes to right turn type.

Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	
Traffic Vol, veh/h	1	3	4	13	9	1
Future Vol, veh/h	1	3	4	13	9	1
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	-
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	1	3	4	14	10	1

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	18	0	-	0	16 11
Stage 1	-	-	-	-	11 -
Stage 2	-	-	-	-	5 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1599	-	-	-	1002 1070
Stage 1	-	-	-	-	1012 -
Stage 2	-	-	-	-	1018 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1599	-	-	-	1001 1070
Mov Cap-2 Maneuver	-	-	-	-	1001 -
Stage 1	-	-	-	-	1011 -
Stage 2	-	-	-	-	1018 -

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1599	-	-	-	1007
HCM Lane V/C Ratio	0.001	-	-	-	0.011
HCM Control Delay (s)	7.3	0	-	-	8.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

HCM 6th TWSC
2: SE 17th Ave & SE McBrod Ave

09/04/2023

Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	2	6	14	2	3	11	492	7	2	675	4
Future Vol, veh/h	4	2	6	14	2	3	11	492	7	2	675	4
Conflicting Peds, #/hr	1	0	0	0	0	1	9	0	0	0	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	0	0	0	1	1	1	2	2	2
Mvmt Flow	4	2	6	15	2	3	12	529	8	2	726	4

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1302	1302	737	1293	1300	534	739	0	0	537	0	0
Stage 1	741	741	-	557	557	-	-	-	-	-	-	-
Stage 2	561	561	-	736	743	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.11	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.209	-	-	2.218	-	-
Pot Cap-1 Maneuver	139	162	422	141	163	550	872	-	-	1031	-	-
Stage 1	411	426	-	518	515	-	-	-	-	-	-	-
Stage 2	516	513	-	414	425	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	133	157	418	135	158	549	865	-	-	1031	-	-
Mov Cap-2 Maneuver	133	157	-	135	158	-	-	-	-	-	-	-
Stage 1	399	421	-	508	505	-	-	-	-	-	-	-
Stage 2	500	503	-	404	420	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB			
HCM Control Delay, s	23.3		31.5		0.2		0			
HCM LOS	C		D							

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	865	-	-	210	156	1031	-	-
HCM Lane V/C Ratio	0.014	-	-	0.061	0.131	0.002	-	-
HCM Control Delay (s)	9.2	0	-	23.3	31.5	8.5	0	-
HCM Lane LOS	A	A	-	C	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.4	0	-	-

HCM 6th Signalized Intersection Summary

3: SE 17th Ave & OR-224

09/04/2023



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	63	369	200	39	394	306
Future Volume (veh/h)	63	369	200	39	394	306
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	1885	1885	1856	1856	1870	1870
Adj Flow Rate, veh/h	66	230	211	0	415	322
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	3	3	2	2
Cap, veh/h	315	807	418		587	1206
Arrive On Green	0.18	0.18	0.23	0.00	0.33	0.64
Sat Flow, veh/h	1795	1598	1856	1572	1781	1870
Grp Volume(v), veh/h	66	230	211	0	415	322
Grp Sat Flow(s),veh/h/ln	1795	1598	1856	1572	1781	1870
Q Serve(g_s), s	1.4	0.0	4.4	0.0	9.0	3.3
Cycle Q Clear(g_c), s	1.4	0.0	4.4	0.0	9.0	3.3
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	315	807	418		587	1206
V/C Ratio(X)	0.21	0.29	0.51		0.71	0.27
Avail Cap(c_a), veh/h	444	922	1044		1684	2988
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	15.7	6.4	15.1	0.0	13.0	3.4
Incr Delay (d2), s/veh	0.2	0.1	0.7	0.0	1.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.7	1.6	0.0	3.0	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	15.9	6.5	15.8	0.0	14.2	3.5
LnGrp LOS	B	A	B		B	A
Approach Vol, veh/h	296		211			737
Approach Delay, s/veh	8.6		15.8			9.5
Approach LOS	A		B			A
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	18.6	14.0			32.6	11.8
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0
Max Green Setting (Gmax), s	42.0	25.0			71.0	11.0
Max Q Clear Time (g_c+I1), s	11.0	6.4			5.3	3.4
Green Ext Time (p_c), s	3.7	0.8			1.6	1.1

Intersection Summary

HCM 6th Ctrl Delay	10.4
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

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

HCM 6th Signalized Intersection Summary

4: OR-99E & SE 17th Ave

09/04/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↕		↖	↕		↖	↕	
Traffic Volume (veh/h)	16	38	287	144	31	23	239	848	131	70	1644	12
Future Volume (veh/h)	16	38	287	144	31	23	239	848	131	70	1644	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	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	1870	1870	1870	1841	1841	1841	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	17	40	218	97	111	8	252	893	133	74	1731	13
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	4	4	4	1	1	1	1	1	1
Cap, veh/h	46	108	377	143	138	10	283	2029	302	95	1984	15
Arrive On Green	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.65	0.65	0.05	0.54	0.54
Sat Flow, veh/h	550	1293	1523	1753	1693	122	1795	3127	466	1795	3644	27
Grp Volume(v), veh/h	57	0	218	97	0	119	252	511	515	74	850	894
Grp Sat Flow(s),veh/h/ln	1843	0	1523	1753	0	1815	1795	1791	1801	1795	1791	1880
Q Serve(g_s), s	3.5	0.0	10.0	6.5	0.0	7.7	16.5	16.8	16.8	4.9	49.4	49.6
Cycle Q Clear(g_c), s	3.5	0.0	10.0	6.5	0.0	7.7	16.5	16.8	16.8	4.9	49.4	49.6
Prop In Lane	0.30		1.00	1.00		0.07	1.00		0.26	1.00		0.01
Lane Grp Cap(c), veh/h	154	0	377	143	0	148	283	1162	1169	95	975	1024
V/C Ratio(X)	0.37	0.00	0.58	0.68	0.00	0.81	0.89	0.44	0.44	0.78	0.87	0.87
Avail Cap(c_a), veh/h	154	0	377	146	0	151	314	1162	1169	150	975	1024
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)	0.99	0.00	0.99	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.0	0.0	40.3	53.6	0.0	54.2	49.5	10.4	10.4	56.1	23.7	23.7
Incr Delay (d2), s/veh	1.1	0.0	1.9	10.9	0.0	25.3	23.4	1.2	1.2	9.5	10.6	10.3
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	1.7	0.0	5.8	3.3	0.0	4.5	9.2	6.7	6.8	2.5	22.8	23.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.1	0.0	42.2	64.5	0.0	79.5	72.9	11.6	11.6	65.6	34.3	34.0
LnGrp LOS	D	A	D	E	A	E	E	B	B	E	C	C
Approach Vol, veh/h		275			216			1278			1818	
Approach Delay, s/veh		44.5			72.7			23.7			35.4	
Approach LOS		D			E			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	0.4	81.9		14.0	22.9	69.3		13.8				
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0				
Max Green Setting (Gmax), s	10.0	74.0		10.0	21.0	63.0		10.0				
Max Q Clear Time (g_c+10), s	10.0	18.8		12.0	18.5	51.6		9.7				
Green Ext Time (p_c), s	0.1	6.8		0.0	0.4	7.8		0.0				

Intersection Summary

HCM 6th Ctrl Delay	34.2
HCM 6th LOS	C

Notes

- User approved pedestrian interval to be less than phase max green.
- User approved volume balancing among the lanes for turning movement.
- User approved changes to right turn type.

Queuing and Blocking Report
 Year 2024 Background Conditions - AM Peak Hour

02/23/2023

Intersection: 2: SE 17th Ave & SE McBrod Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	24	105	24	5
Average Queue (ft)	2	32	1	0
95th Queue (ft)	16	81	10	3
Link Distance (ft)	574	413	573	621
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: SE 17th Ave & OR-224

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	R	L	T
Maximum Queue (ft)	105	228	285	186	210	78
Average Queue (ft)	24	88	122	7	86	20
95th Queue (ft)	68	173	244	69	162	60
Link Distance (ft)		1486	1677			573
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	135			135	160	
Storage Blk Time (%)		2	8		1	
Queuing Penalty (veh)		1	2		1	

Intersection: 4: OR-99E & SE 17th Ave

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	114	107	125	177	397	429	442	192	324	298
Average Queue (ft)	50	46	13	94	250	262	256	82	188	157
95th Queue (ft)	99	85	69	165	397	438	413	164	294	269
Link Distance (ft)	1677			704		425	425		839	839
Upstream Blk Time (%)						2	2			
Queuing Penalty (veh)						0	0			
Storage Bay Dist (ft)		150	130		375			375		
Storage Blk Time (%)	0	0	0	6	2	2				
Queuing Penalty (veh)	0	0	0	2	11	7				

Network Summary

Network wide Queuing Penalty: 24

Queuing and Blocking Report
 Year 2024 Background Conditions - PM Peak Hour

02/23/2023

Intersection: 2: SE 17th Ave & SE McBrod Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	31	46	56	9
Average Queue (ft)	5	11	3	0
95th Queue (ft)	24	36	27	5
Link Distance (ft)	574	413	573	621
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: SE 17th Ave

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	T	L	T
Maximum Queue (ft)	80	136	250	204	131
Average Queue (ft)	29	47	103	104	33
95th Queue (ft)	61	98	209	174	89
Link Distance (ft)		1486	1677		573
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	135			160	
Storage Blk Time (%)		0	5	1	0
Queuing Penalty (veh)		0	2	4	0

Intersection: 4: OR-99E & SE 17th Ave

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	328	175	154	314	374	385	376	399	858	858
Average Queue (ft)	110	133	90	168	218	163	157	110	513	470
95th Queue (ft)	286	198	195	263	353	312	300	313	844	789
Link Distance (ft)	1677			704		425	425		839	839
Upstream Blk Time (%)						0	0		3	2
Queuing Penalty (veh)						0	0		0	0
Storage Bay Dist (ft)		150	130		375			375		
Storage Blk Time (%)	0	15	2	30	0	0			21	
Queuing Penalty (veh)	0	8	3	21	1	0			15	

Network Summary

Network wide Queuing Penalty: 55

Queuing and Blocking Report
 Year 2024 Buildout Conditions - AM Peak Hour

02/23/2023

Intersection: 1: SE McBrod Ave & Site Access

Movement	SB
Directions Served	LR
Maximum Queue (ft)	31
Average Queue (ft)	11
95th Queue (ft)	35
Link Distance (ft)	409
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: SE 17th Ave & SE McBrod Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	31	86	54	17
Average Queue (ft)	11	30	2	1
95th Queue (ft)	35	71	26	12
Link Distance (ft)	571	413	573	621
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: SE 17th Ave & OR-224

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	R	L	T
Maximum Queue (ft)	62	207	367	235	170	65
Average Queue (ft)	22	80	139	10	81	13
95th Queue (ft)	51	150	292	87	141	44
Link Distance (ft)		1486	1677			573
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	135			135	160	
Storage Blk Time (%)		1	9		0	
Queuing Penalty (veh)		1	2		1	

Queuing and Blocking Report
 Year 2024 Buildout Conditions - AM Peak Hour

02/23/2023

Intersection: 4: OR-99E & SE 17th Ave

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	125	121	154	240	399	438	441	194	353	334
Average Queue (ft)	46	42	30	108	256	262	267	80	193	161
95th Queue (ft)	92	81	117	195	408	424	434	149	320	285
Link Distance (ft)	1677				704				839	
Upstream Blk Time (%)						2	1			
Queuing Penalty (veh)						0	0			
Storage Bay Dist (ft)	150		130		375			375		
Storage Blk Time (%)	0	0	0	8	2	2			0	
Queuing Penalty (veh)	0	0	0	3	13	7			0	

Network Summary

Network wide Queuing Penalty: 27

Queuing and Blocking Report
 Year 2024 Buildout Conditions - PM Peak Hour

02/23/2023

Intersection: 1: SE McBrod Ave & Site Access

Movement	SB
Directions Served	LR
Maximum Queue (ft)	31
Average Queue (ft)	10
95th Queue (ft)	34
Link Distance (ft)	429
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: SE 17th Ave & SE McBrod Ave

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	30	42	71	9
Average Queue (ft)	11	14	7	0
95th Queue (ft)	35	39	32	6
Link Distance (ft)	493	413	574	621
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: SE 17th Ave & OR-224

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	R	L	T
Maximum Queue (ft)	73	129	312	188	191	94
Average Queue (ft)	28	39	96	8	95	27
95th Queue (ft)	59	83	214	79	163	72
Link Distance (ft)		1486	1677			574
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	135			135	160	
Storage Blk Time (%)		0	4		1	0
Queuing Penalty (veh)		0	2		3	0

Queuing and Blocking Report
 Year 2024 Buildout Conditions - PM Peak Hour

02/23/2023

Intersection: 4: OR-99E & SE 17th Ave

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	323	175	154	311	392	437	360	400	856	850
Average Queue (ft)	103	139	93	165	223	182	163	118	507	474
95th Queue (ft)	265	203	193	263	359	353	302	331	807	772
Link Distance (ft)	1677		704		425		425		839	839
Upstream Blk Time (%)					1	0	3		2	
Queuing Penalty (veh)					0		0	0		0
Storage Bay Dist (ft)	150		130		375			375		
Storage Blk Time (%)	1	16	2	28	2	0	0	20		
Queuing Penalty (veh)	2	9	2	20	7	0	0	14		

Network Summary

Network wide Queuing Penalty: 58