

# Exhibit G





# KITTELSON & ASSOCIATES, INC.

TRANSPORTATION ENGINEERING / PLANNING

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## MEMORANDUM

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Date: February 7, 2017 Project #: 20703

To: Brett Kolver, AICP, City of Milwaukie  
Rick Nys, PE, PTOE and Christian Snuffin, PE, PTOE, Clackamas County  
Avi Tayar, PE and Andy Jeffrey, PE, ODOT  
Mat Dolata, PE, PTP, DKS

CC: Serah Breakstone and Scott Emmons, PE, DOWL

From: Kristine Connolly, Zachary Horowitz, and Chris Brehmer, PE, Kittelson & Associates, Inc.

Project: Kellogg Creek Townhomes

Subject: Traffic Impact Study

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Brownstone Homes, Inc. is proposing to develop property located at 1333 Rusk Road. The site is located within the City of Milwaukie, south of the Milwaukie Expressway (referred to as OR-224 in the remainder of this report), west of SE Rusk Road, and north of SE Kellogg Creek Drive. Today, the site is primarily open space though the southeast corner of the site is occupied by the Turning Point Church. After construction, the site will include 92 townhome units in addition to the church. A zoning map change is required as part of the Planned Development (PD) process being pursued with the project site application because the PD increases the site density, but the Comprehensive Plan designation remains unchanged. This traffic impact study report documents the transportation impacts associated with site redevelopment in the near-term opening year.

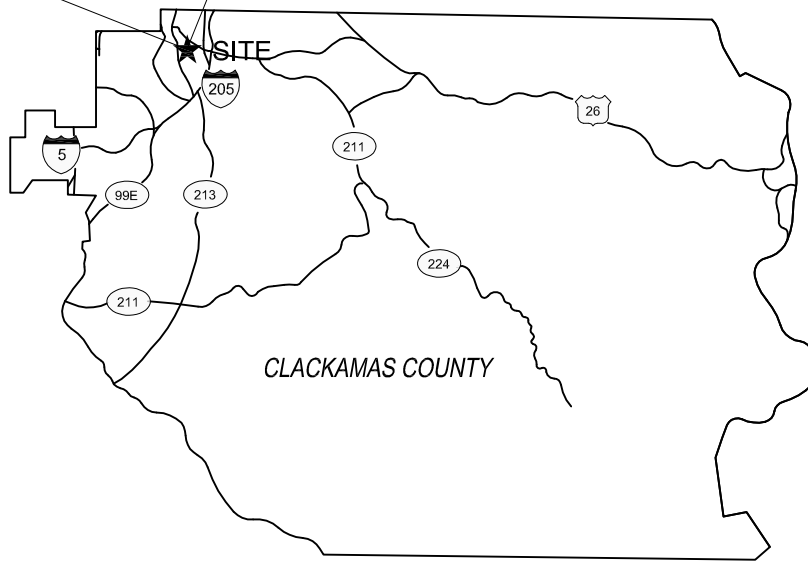
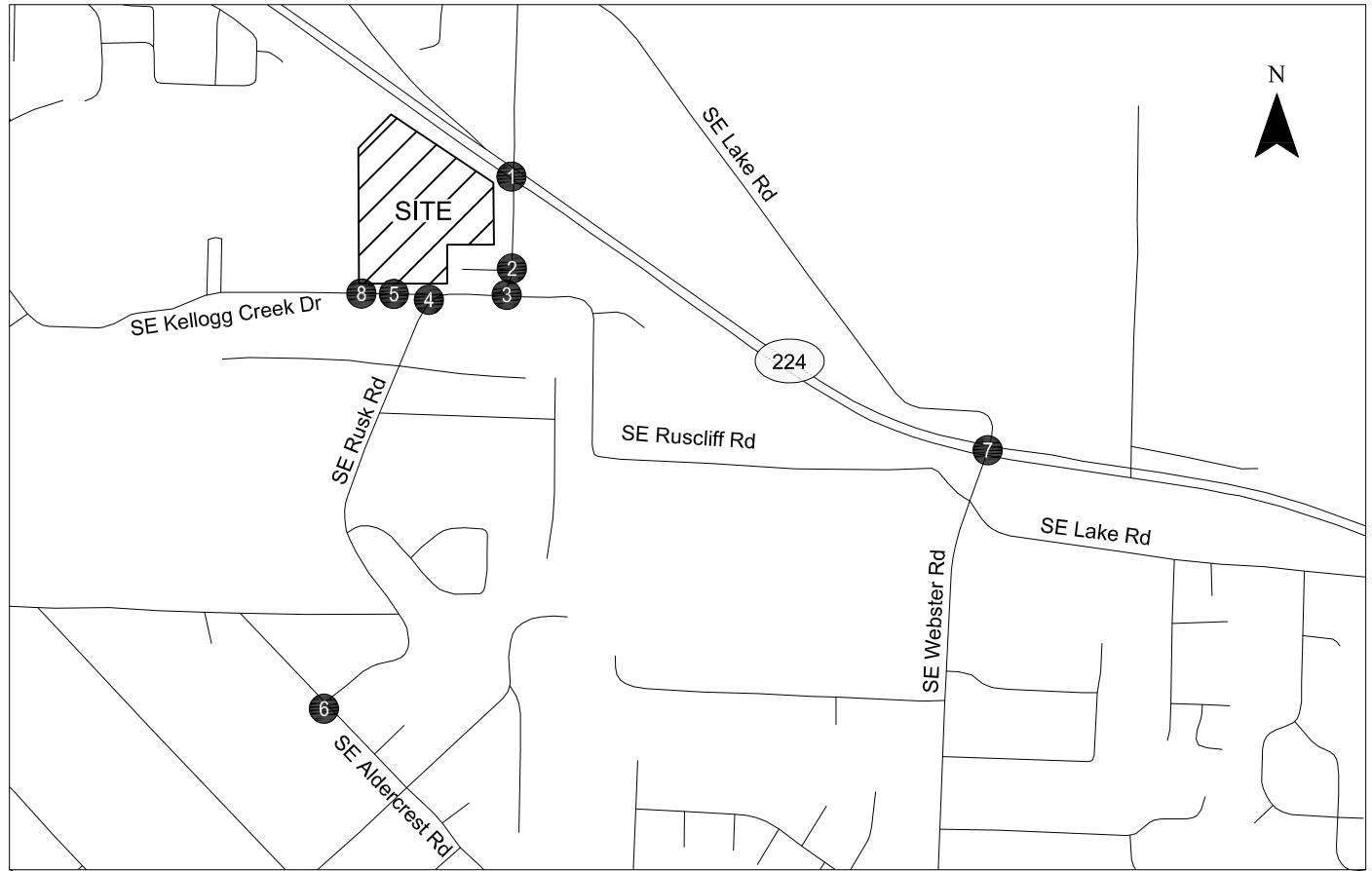
## SUMMARY OF FINDINGS

The primary findings of the analysis include:

- All study intersections are forecast to operate within the applicable review agency operational standards under existing and site opening year 2018 scenarios studied during the weekday AM, midday, and PM peak hours.
- Historical crash data for the study area intersections indicate no patterns or trends that require mitigation associated with this project.
- Projected 95<sup>th</sup> percentile queues can be accommodated within the existing storage areas at the study intersections, with the exception of the intersection of OR-224/SE Webster Road, where existing and background weekday peak hour 95<sup>th</sup> percentile queues exceed the available storage for the westbound left-turn (weekday PM peak hour) and the northbound left-turn (weekday AM, midday, and PM peak hours).
- Landscaping, signage, and utilities should be located and maintained to ensure adequate intersection sight lines are available.
- The proposed zoning map amendment with site development does not result in a net increase in the overall trip generation potential of the site on a daily or weekday peak hour basis above what is allowed by the City of Milwaukie's Comprehensive Plan.

- The proposed zoning map amendment will not require changes to the functional classification of existing or planned transportation facilities, will not require a change to the standards implementing the comprehensive plan, and will not significantly affect a transportation facility. Accordingly, because the proposed zoning map amendment does not increase the density of the site above what is allowed by the City of Milwaukie's Comprehensive Plan or result in a significant effect on the transportation system, no review of mitigation for Transportation Planning Rule (TPR) purposes is necessary.

The site location and overall vicinity are shown in **Figure 1**, and a conceptual site plan is shown in **Figure 2**.

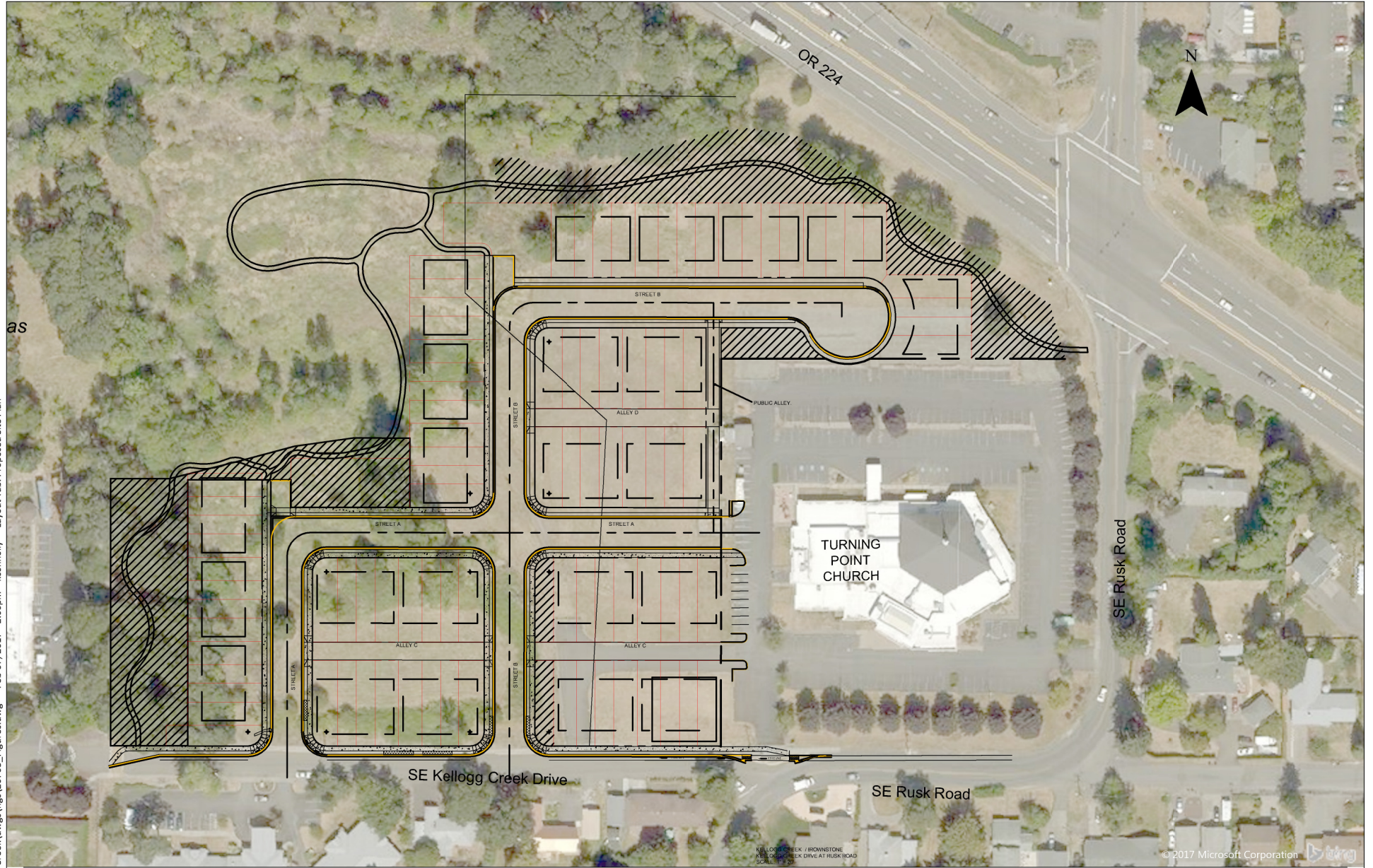


● - Study Intersections

Site Vicinity Map  
Milwaukie, Oregon

Figure  
1

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Site Plan Provided By DOWL 2017-02-06

Proposed Site Plan  
Milwaukie, Oregon

Figure  
2

## SCOPE OF THE REPORT

This report identifies the transportation-related impacts associated with the proposed development and was prepared in accordance with the City of Milwaukie, Clackamas County, and ODOT requirements. Per City, County, and ODOT staff direction, operational analyses were performed at the following study intersections during the weekday AM, midday, and PM peak periods:

- SE Rusk Road/OR-224
- SE Kellogg Creek Drive/SE Ruscliff Road
- SE Kellogg Creek Drive/Rusk Road
- SE Rusk Road/SE Aldercrest Road
- SE Kellogg Creek Drive/Church Driveway (this existing driveway become the East Site Driveway access once the development is complete)
- SE Kellogg Creek Drive/West Site Driveway (new)
- SE Rusk Road/Church Driveway
- OR-224/SE Webster Road

This report evaluates the following transportation issues:

- Existing land use and transportation system conditions within the site vicinity during the weekday AM, midday, and PM peak periods;
- Forecast year 2018 background traffic conditions during the weekday AM, midday, and PM peak periods, considering other development and transportation improvements planned in the study area;
- Trip generation and distribution estimates for the proposed development;
- Forecast year 2018 total traffic conditions during the weekday AM, midday and PM peak periods with build-out of the site;
- Review of applicable City of Milwaukie requirements, including sight distance, access standards, and turn-lane warrants; and
- Findings and recommendations.

## Analysis Methodology

All level-of-service analyses described in this report were performed in accordance with the procedures stated in the *2000 Highway Capacity Manual* (HCM) (Reference 1). The peak 15-minute flow rates were used in the evaluation of all intersection levels of service (LOS) and volume-to-capacity ratios (v/c). For this reason, the analyses reflect conditions that are only likely to occur for 15 minutes out of each average peak hour (*refer to Attachment A for additional details*). Traffic conditions during typical weekday hours are expected to operate with lower levels of delay than

those described in this report. The operations analysis presented in this report was completed using Synchro 8 software.

### Applicable Operating Standards

Chapter 8 of the *City of Milwaukie Transportation System Plan* (Reference 2) defines the minimum acceptable measure of effectiveness for intersections during the peak hour as LOS “D” for both signalized and stop-controlled intersections.

Chapter 5 of the *Clackamas County Comprehensive Plan* (Reference 3) sets performance evaluation standards for the urban area (Table 5-2a). Per these standards, a maximum volume-to-capacity ratio of 0.90 must be maintained during the midday peak hour and a maximum of 0.99 during the weekday PM peak hour.

The *Oregon Highway Plan* (OHP) (Reference 4) requires a maximum volume-to-capacity ratio of 0.99 at ODOT-maintained intersections.

**Table 1** lists the study intersections, the responsible jurisdiction, and the corresponding operating standard.

**Table 1. Operating Standards at Study Intersections**

Study Intersection	Jurisdiction	Intersection Operating Standard
SE Rusk Road/OR-224	ODOT	Intersection V/C ≤ 0.99
SE Kellogg Creek Drive/SE Ruscliff Road	City of Milwaukie & Clackamas County	LOS “D” & Midday V/C ≤ 0.90, PM V/C ≤ 0.99
SE Kellogg Creek Drive/Rusk Road	City of Milwaukie & Clackamas County	LOS “D” & Midday V/C ≤ 0.90, PM V/C ≤ 0.99
SE Rusk Road/SE Aldercrest Road	City of Milwaukie & Clackamas County	LOS “D” & Midday V/C ≤ 0.90, PM V/C ≤ 0.99
SE Kellogg Creek Drive/Church Driveway	City of Milwaukie	LOS “D”
SE Kellogg Creek Drive/West Site Driveway (new)	City of Milwaukie	LOS “D”
SE Rusk Road/Church Driveway	City of Milwaukie & Clackamas County	LOS “D” & Midday V/C ≤ 0.90, PM V/C ≤ 0.99
OR-224/SE Webster Road	ODOT	Intersection V/C ≤ 0.99



## EXISTING CONDITIONS

This section summarizes the existing characteristics of the transportation system and adjacent land uses in the vicinity of the proposed development, including an inventory of the existing multimodal transportation facilities and options, an evaluation of existing intersection operations for motor vehicles at the study intersections, and a summary of recent study intersection crash history.

### Site Conditions and Adjacent Land Uses

The proposed site is located in the City of Milwaukie, although SE Rusk Road, the adjacent street to the property is one of the dividing lines between the City and unincorporated Clackamas County. The site is mostly open space, but includes the Turning Point Church and its surface parking lot. Today, there are two access points that serve the church: one located at the east end of the property on SE Rusk Road and one located on the south side of the property on SE Kellogg Creek Drive.

### Transportation Facilities

**Figure 3** illustrates the existing lane configurations and traffic control devices at the study intersections. **Table 2** summarizes the attributes of key roadways in the vicinity.

**Table 2. Street Characteristics in Site Vicinity**

Street	Classification	Motor Vehicle Travel Lanes	Posted Speed (mph)	Sidewalks	Striped Bicycle Lanes	On-Street Parking
OR-224	Regional Route <sup>1</sup> Principal Expressway <sup>2</sup>	5-6 <sup>3</sup>	50	No	No	No
SE Rusk Road	Collector <sup>1,2</sup>	2	30	Partial <sup>4</sup>	No	Yes <sup>5</sup>
SE Kellogg Creek Drive	Local Street <sup>1</sup>	2	25	Yes <sup>6</sup>	No	South side
SE Ruscliff Road	Local Street <sup>2</sup>	2	25	No	No	Yes
SE Aldercrest Road	Local Street <sup>2</sup>	2	30	No	No	Yes <sup>5</sup>

<sup>1</sup>Per *City of Milwaukie Transportation System Plan*, Table 8-1 (Reference 2)

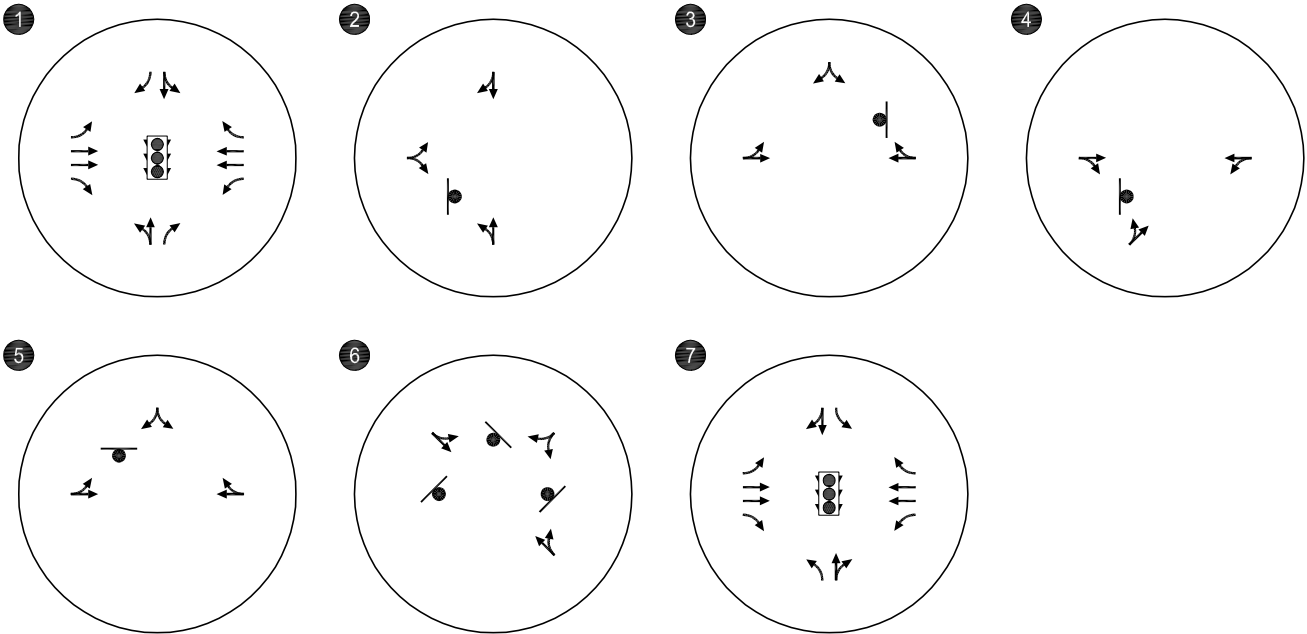
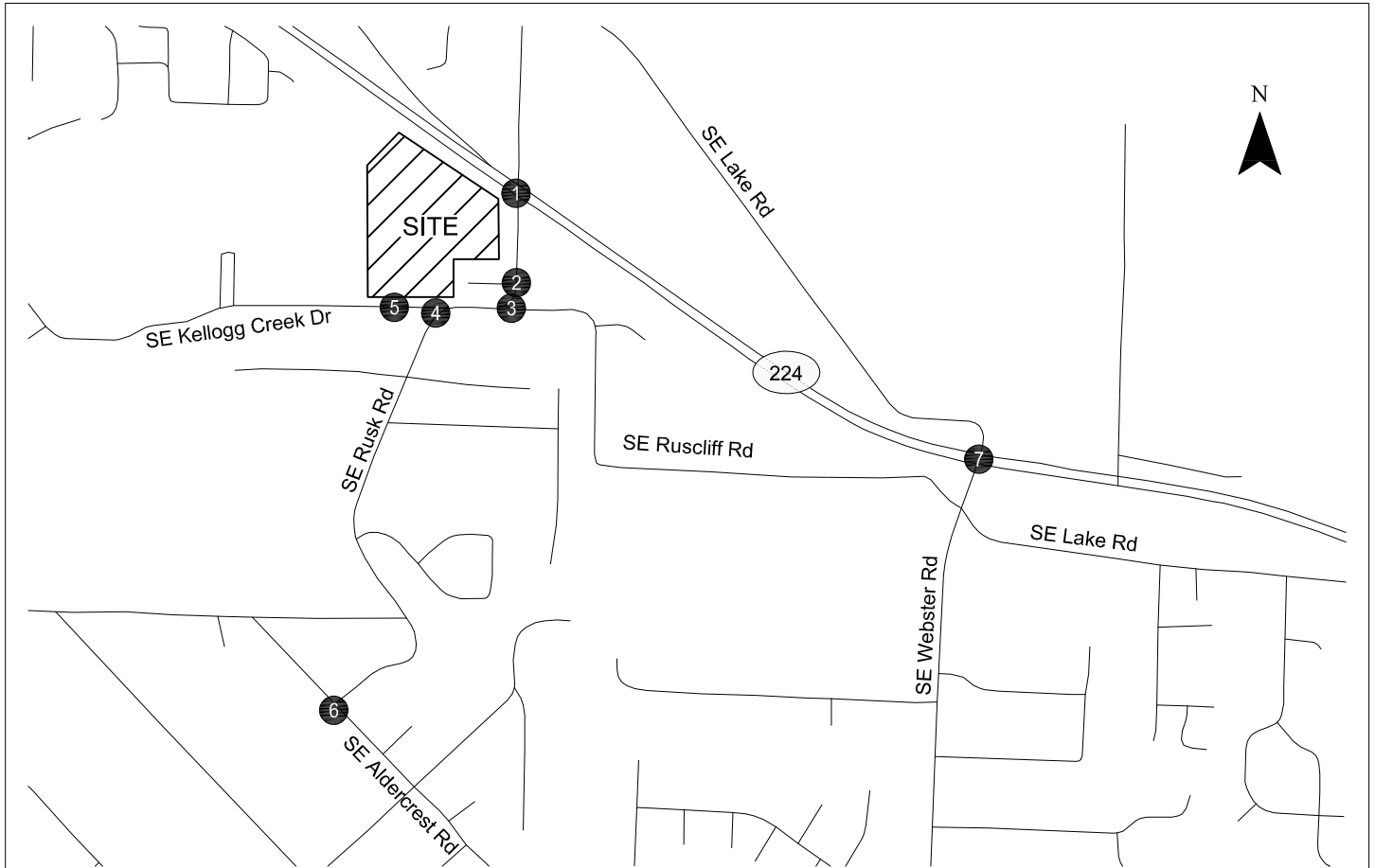
<sup>2</sup>Per *Clackamas County Comprehensive Plan*, Map 5-4a (Reference 3)



<sup>3</sup>OR-224 widens to a six-lane cross-section at the intersections of SE Rusk Rd and SE Webster to accommodate right-turn lanes.

<sup>4</sup>There is a sidewalk on the east side of SE Rusk Road between SE Eastbrook Drive and SE Robhil Drive. There is a sidewalk on the west side of SE Rusk Road from SE Eric Street north approximately 250'. There is a sidewalk on the north and west sides of SE Rusk Road from SE Kellogg Creek Drive to OR-224.

<sup>5</sup>Some on-street parking is available in front of homes and/or sections of sidewalk.

<sup>6</sup>There is no sidewalk on the south side of SE Kellogg Creek Drive between Deerfield Village Assisted Living and SE Rusk Road.



-  - STOP SIGN
-  - TRAFFIC SIGNAL

Existing Lane Configurations  
& Traffic Control Devices  
Milwaukie, Oregon

Figure  
3

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### Roadway Cross Section Standards

The City of Milwaukie maintains typical cross-sections for roadways based on functional classification, as detailed in the City's *Transportation System Plan* (Reference 2). The typical cross-sections for collectors and local/neighborhood streets such as SE Rusk Road and SE Kellogg Creek Drive are shown in **Figure 4**.

**Figure 4. Typical Collector and Local/Neighborhood Street Cross-Sections**

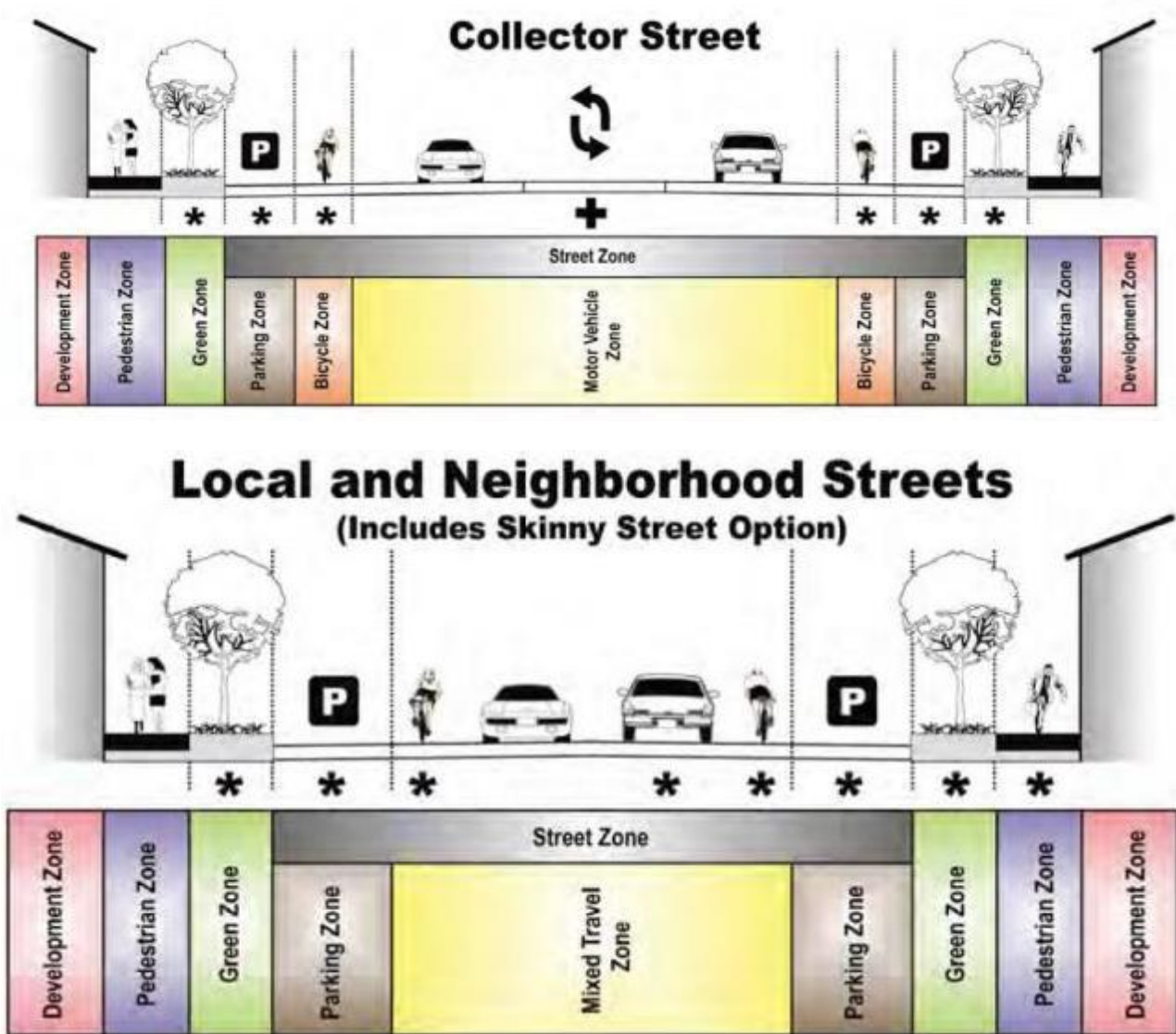


Image Source: City of Milwaukie *Transportation System Plan*, Figure 10-1

The asterisks shown in **Figure 4** indicate optional elements for constrained right-of-ways. The site frontages on SE Rusk Road and SE Kellogg Creek Drive abut a 25-foot existing half-street right-of-way and contain the sidewalk and a single travel lane. Subject to final City and County direction, the Applicant proposes to construct and dedicate an additional nine feet along the site's frontage consistent with this local and neighborhood street cross section. The Applicant's design team will

work closely with City and County staff to develop appropriate frontage improvements to the existing roadway sections along the site frontage.

### ***Pedestrian Facilities***

The entire site frontages on both SE Rusk Road and SE Kellogg Creek Drive have sidewalks along their lengths. There are painted crosswalks on three approaches (none on the eastern approach) of the OR-224/SE Rusk Road intersection. The north side of SE Rusk Road at the three-legged intersection with SE Kellogg Creek Drive has a curb bulb-out. The North Clackamas Park and the Milwaukie Community Center can be reached via sidewalk from the site, and there is a marked crosswalk at the entrance to the park. The closest pedestrian crossing of Mt. Scott Creek is via a trail through the park, which provides access to SE Casa Del Rey Drive and then a completed sidewalk access route to SE Lake Road west of OR-224.

### ***Bicycle Facilities***

No striped on-street bicycle facilities are provided within the project vicinity.

### ***Transit Facilities***

Per TriMet's online schedule, (Reference 5) weekday bus service is provided by TriMet Route 152 (Milwaukie) along SE Kellogg Creek Drive and SE Rusk Road between downtown Milwaukie and Clackamas Town Center from 6:30 AM to 6:30 PM. Headways change throughout the day and range from approximately 30 minutes during the AM, midday, and PM peak periods to 90 minutes during the late morning hours. The closest stop is across SE Kellogg Creek Drive from the site in front of the Deerfield Village Assisted Living facility (south of the study site).

TriMet Route 29 (Lake/Webster Road) operates along SE Lake Road between downtown Milwaukie and Clackamas Town Center approximately every 75 minutes on weekdays from 5:30 AM to 8:00 PM. The closest stop to the site is at the intersection of SE Rusk Road/SE Lake Road on the north side of OR-224, slightly less than ½-mile away.

TriMet Route 30 (Estacada) operates along OR-224 between Estacada and downtown Portland via Clackamas Town Center once per weekday in each direction. The closest stop to the site is at the intersection of SE Webster Road/SE Lake Road.

### ***Safe Walk Paths to Schools***

Alder Creek Middle School is the only school in the North Clackamas School District that is located within a one-mile walk of the proposed development. According to the Safe Walk Paths to School area of the North Clackamas School District website (Reference 6), there is no route that has been identified as safe from the proposed development to Alder Creek Middle School. The closest point on a route that has been identified begins on SE Eric Street east of the intersection with SE Rusk Road.

From this locations, students can walk east on SE Eric Street, south on SE Briarfield Court, and then east on a combination of off-street dirt paths to reach the west side of the school near the ball fields.

### Crash History Analysis

Reported crash history for each study intersection was reviewed in an effort to identify potential intersection safety issues. Reported crash data for the study intersections were obtained from ODOT for the three-year period from January 1, 2012 through December 31, 2014. **Table 3** summarizes the crashes reported at the study intersections. The majority of the reported crashes observed in the site vicinity have occurred at the intersection of OR-224/SE Webster Road. *Attachment “B” contains the ODOT crash data.*

**Table 3. Intersection Crash History (January 1, 2012 through December 31, 2014)**

Intersection	Collision Type					Severity			Total Crashes
	Rear End	Turning	Sideswipe	Angle	Back	PDO <sup>1</sup>	Injury	Fatality	
OR-224/ SE Rusk Road	2	0	0	1	0	1	2	0	3
OR-224/ SE Webster Road	8	11	6	3	0	12	16	0	28
SE Rusk Road/ SE Ruscliff Road	0	1	0	0	0	1	0	0	1
SE Rusk Road/ SE Kellogg Creek Drive	0	2	0	0	0	2	0	0	2
SE Rusk Road/ SE Aldercrest Road	0	0	0	0	0	0	0	0	0

<sup>1</sup>PDO – Property damage only

Critical crash rates were calculated for each of the study intersections following the analysis methodology presented in ODOT’s *SPR 667 Assessment of Statewide Intersection Safety Performance* (Reference 7). SPR 667 provided average crash rates at a variety of intersection configurations in Oregon based on number of approaches and traffic control types. The average crash rate represents the approximate number of crashes that are “expected” at a study intersection. Additionally, this average crash rate was used to calculate the critical crash rate for each study intersection, based on the *Highway Safety Manual* methodology (Reference 8). The critical crash rate is calculated for each intersection based on the average crash rate for each facility and serves as a threshold for further analysis.

**Table 4** summarizes the critical crash rate for each intersection and compares those values to the observed crash rate. Per ODOT, if the observed crash rate at the study location exceeds the critical rate, it is a possible indication that the location is exceeding average crash rates. As shown in **Table 4**, the observed crash rate at all intersections is less than the critical crash rates.

**Table 4. Intersection Crash Rate Assessment**

Location	Total Crashes	Critical Crash Rate by Intersection	Critical Crash Rate by Volume	Observed Crash Rate at Intersection	Observed Crash Rate>Critical Crash Rate?
OR-224/SE Rusk Road	3	0.67	0.58	0.05	No
OR-224/SE Webster Road	28	0.66	0.57	0.37	No
SE Rusk Road /SE Ruscliff Road	1	0.48	0.50	0.11	No
SE Rusk Road/SE Kellogg Creek Drive	2	0.46	0.48	0.20	No
SE Rusk Road/SE Aldercrest Road	0	0.48	0.50	0.00	No

No safety-based mitigations were identified for implementation in conjunction with the proposed Kellogg Creek Townhome development based on review of the historic crash data alone. A review of intersection sight distance is provided below.

**Existing Access Point Sight Distance**

Section 240 of the *Clackamas County Roadway Design Standards* (Reference 9) establishes the intersection sight distance requirements associated with the existing church/shared site driveway on SE Kellogg Creek Drive and the driveway on SE Rusk Road<sup>1</sup>. Based on the field-measured sight distance, neither existing access point meets the County’s sight distance requirements for a side street left-turn from a stop as documented in **Table 5**.

**Table 5. Existing Intersection Sight Distances**

Intersection	Measured Sight Distance - Facing Right (feet)	Measured Sight Distance - Facing Left (feet)	Speed (MPH) <sup>1</sup>	Desired Minimum Intersection Sight Distance (feet) <sup>2</sup>	Adequate?
SE Rusk Road/Church East Driveway	150	350	35	390 <sup>2</sup>	No
SE Kellogg Creek Drive/Church South Driveway	> 500	215	30	335 <sup>2</sup>	No

<sup>1</sup> MPH = miles per hour

<sup>2</sup> Desired minimum sight distance based on Clackamas County Roadway Standards, Section 240 and design speed per Section 250.1.2.c.2

The existing SE Rusk Road church driveway is signed for one-way inbound movement and has sufficient sight distance for one-way ingress only. Egress movements were recorded at the driveway despite the one-way signing. Regardless of the proposed site development, it may be appropriate for

<sup>1</sup> Clackamas County Roadway Standards Section 250.1.2.c.2 defines the design speed of roadways as the existing regulatory speed plus five mph. Per Section 240 Table 2-6, a roadway with a design speed of 30 mph (SE Kellogg Creek Drive) shall have an intersection sight distance of 335 feet for a left-turn from a stop while a roadway with a design speed of 35 mph (SE Rusk Road) shall have an intersection sight distance of 390 feet for a left-turn from a stop. Per Section 240.4, intersection sight distance shall typically be measured from a driver’s eye height of 3.5 feet and 14.5 feet from the edge of the nearest travel lane to an object height of 3.5 feet above the roadway surface.

the church to provide additional signage or a physical barrier to prevent vehicles from exiting the church driveway onto SE Rusk Road. Signage could include a “DO NOT ENTER” (R5-1) and/or a “ONE WAY” (R6-1) installed as per the MUTCD (Reference 10).

While the existing church access location onto SE Kellogg Creek Drive does not satisfy County sight distance standards per *Clackamas County Roadway Standards* Section 240.4, it is proposed to be vacated and relocated further west as described later in this report.

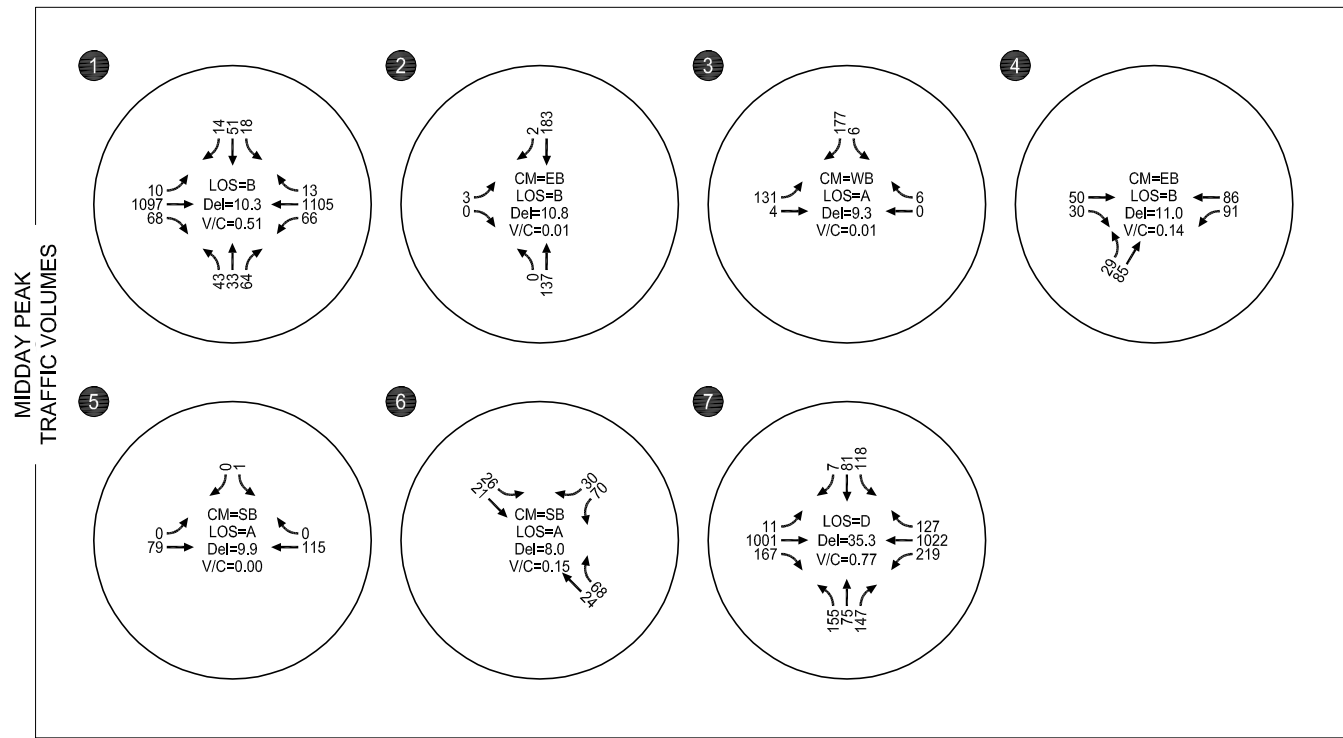
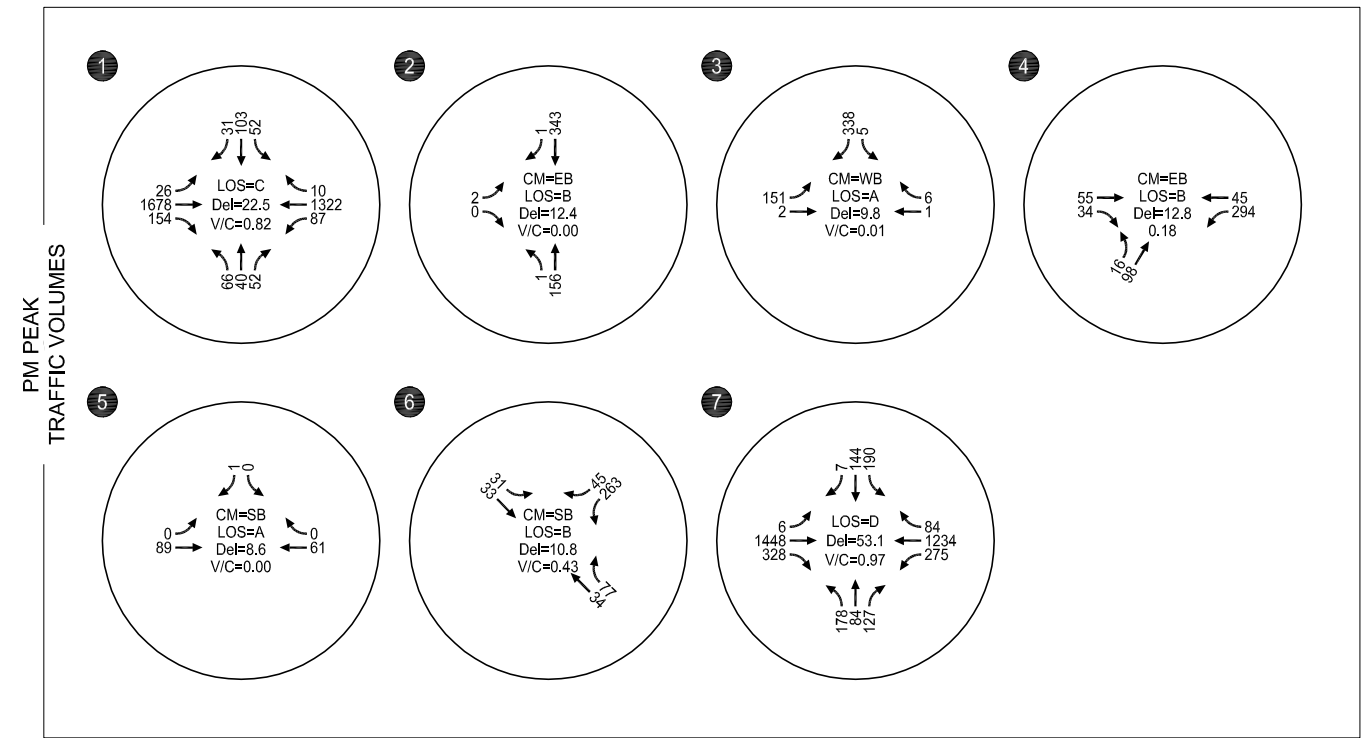
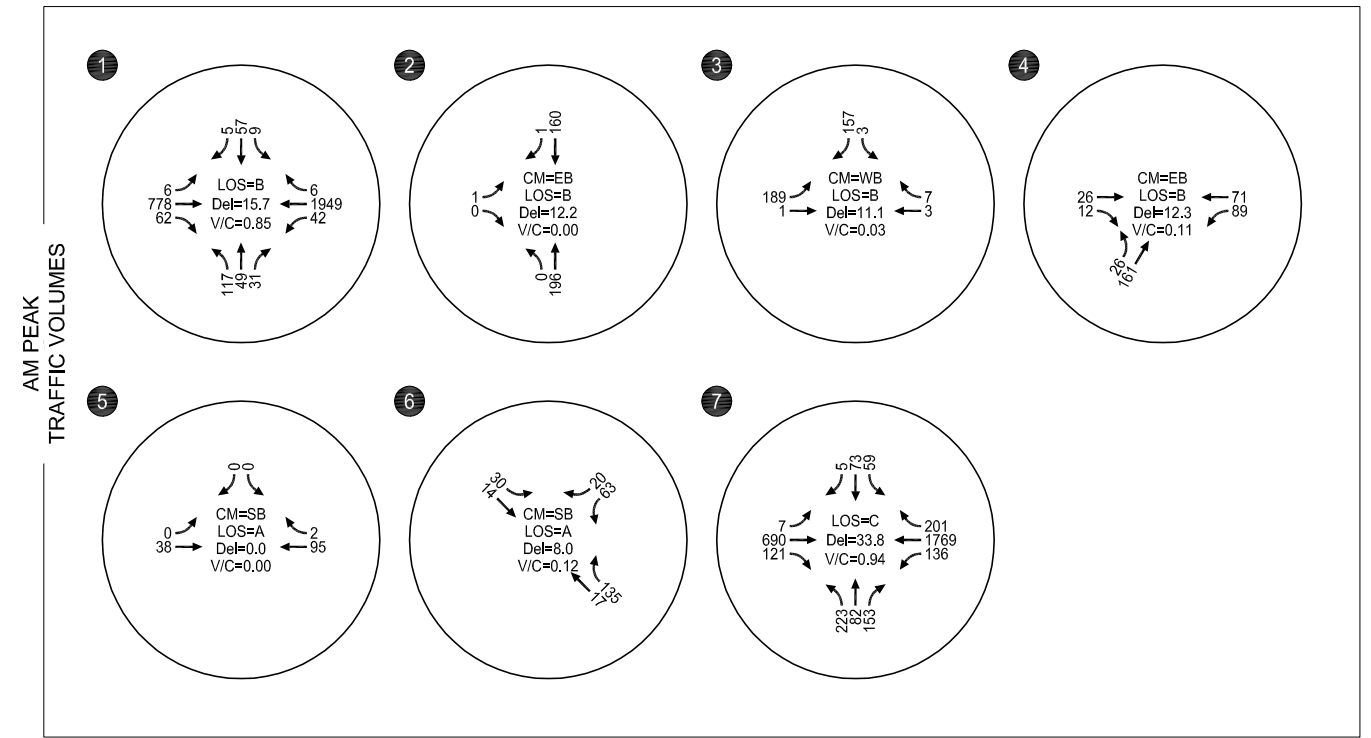
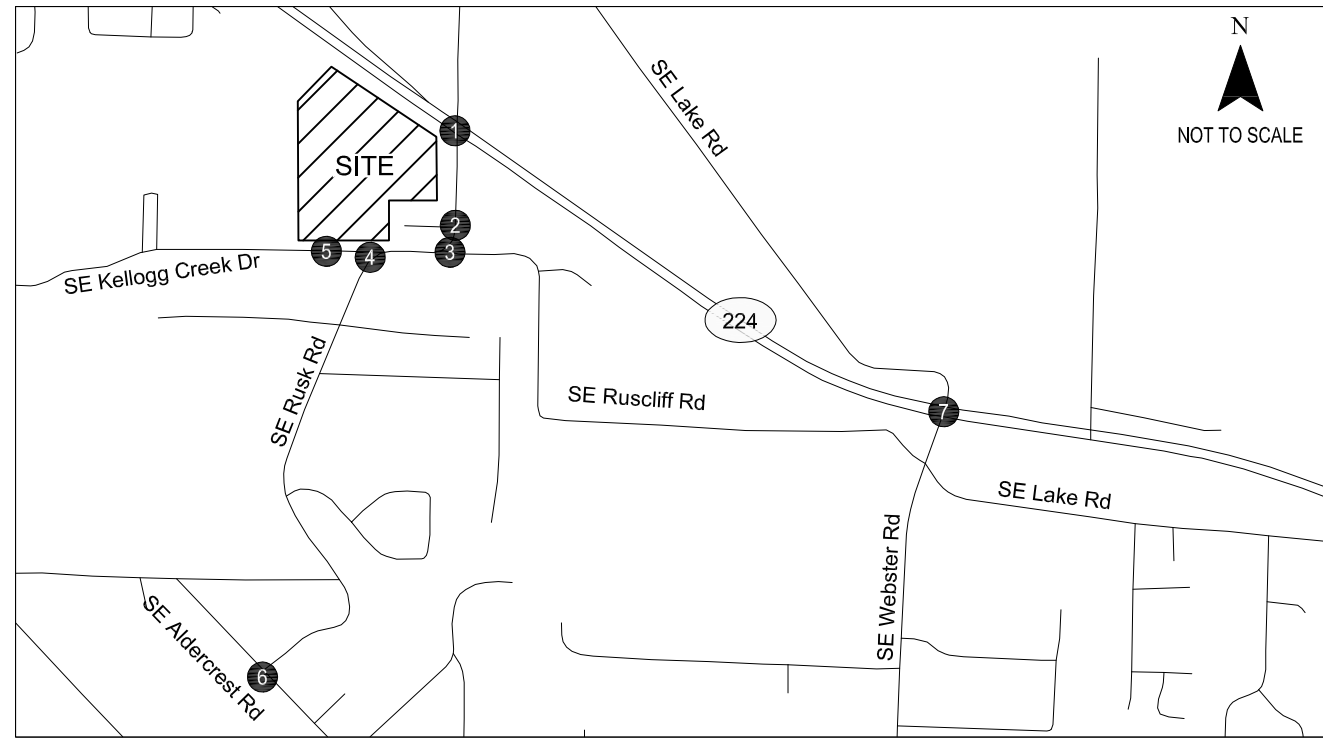
### Existing Conditions Operational Analysis

Manual turning movement counts were collected at the study intersections in November 2016. Traffic counts were collected during the weekday morning (7:00 AM to 9:00 AM), midday (11:00 AM to 1:00 PM), and evening (4:00 PM to 6:00 PM) peak periods. ODOT provided traffic signal phasing and timing for the OR-224/SE Rusk Road and OR-224/SE Webster Road intersections.

Per the traffic counts collected, weekday morning, midday, and evening operations were evaluated using system-wide peak hours of 7:35 AM to 8:35 AM, 11:55 AM and 12:55 PM, and 4:25 PM to 5:25 PM, respectively. *Attachment C contains the traffic count worksheets.*

**Figure 5** summarizes the existing traffic conditions at the study intersections during the weekday AM, midday, and PM peak hours. As shown in **Figure 5**, all intersections operate within applicable City, County, and ODOT standards during all three peak hours. *Attachment D includes the existing operations analysis worksheets.*

West of the site on SE Kellogg Creek Drive, there is access to North Clackamas Park. The counts conducted in November did not capture peak summer park activity. However, the SE Kellogg Creek Drive/SE Rusk Road intersection operates at LOS “B” during the weekday AM, midday, and PM peak hours. The increased summer park traffic is not expected to degrade peak hour intersection operations below acceptable levels (LOS “D”) in part because the typical peak for park users is after the evening (4:00 PM to 6:00 PM) peak for adjacent street traffic.



CM = CRITICAL MOVEMENT (TWSC)  
 LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)  
 Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)  
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO  
 TWSC = TWO-WAY STOP CONTROL  
 AWSC = ALL-WAY STOP CONTROL

Existing Traffic Conditions  
 AM, Midday & PM Peak Hours  
 Milwaukie, Oregon

Figure  
 5

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## TRAFFIC IMPACT ANALYSIS

The traffic impact analysis identifies how the study area’s transportation system would operate in the year 2018 upon development of the site. This section of the report includes analysis of 2018 background traffic volumes and operations, an estimate of site-generated trips, and analysis of 2018 total traffic volumes and operations with the proposed development.

### 2018 Background Operational Analysis

Background traffic volumes include changes in volumes due to added trips from in-process developments in the vicinity of the site as well as general regional growth. Per direction from City of Milwaukie staff, no planned transportation improvements or in-process developments are included in the background traffic analysis and a 0.61 percent compounded annual growth rate<sup>2</sup> was applied to the existing traffic volumes to reflect near-term growth. This results in a background growth rate of 1.22 percent.

**Figure 6** illustrates the 2018 background traffic volumes and corresponding operational analysis for the weekday AM, midday, and PM peak hours. As shown, all of the intersections are expected to continue to satisfy applicable City, County, and ODOT standards under background conditions. *Attachment E includes the 2018 background operations analysis worksheets.*

## PROPOSED DEVELOPMENT PLAN

The proposed site redevelopment will provide a total of 92 townhomes. The existing access point on SE Kellogg Creek Drive will be vacated and replaced with two new access points farther to the west.

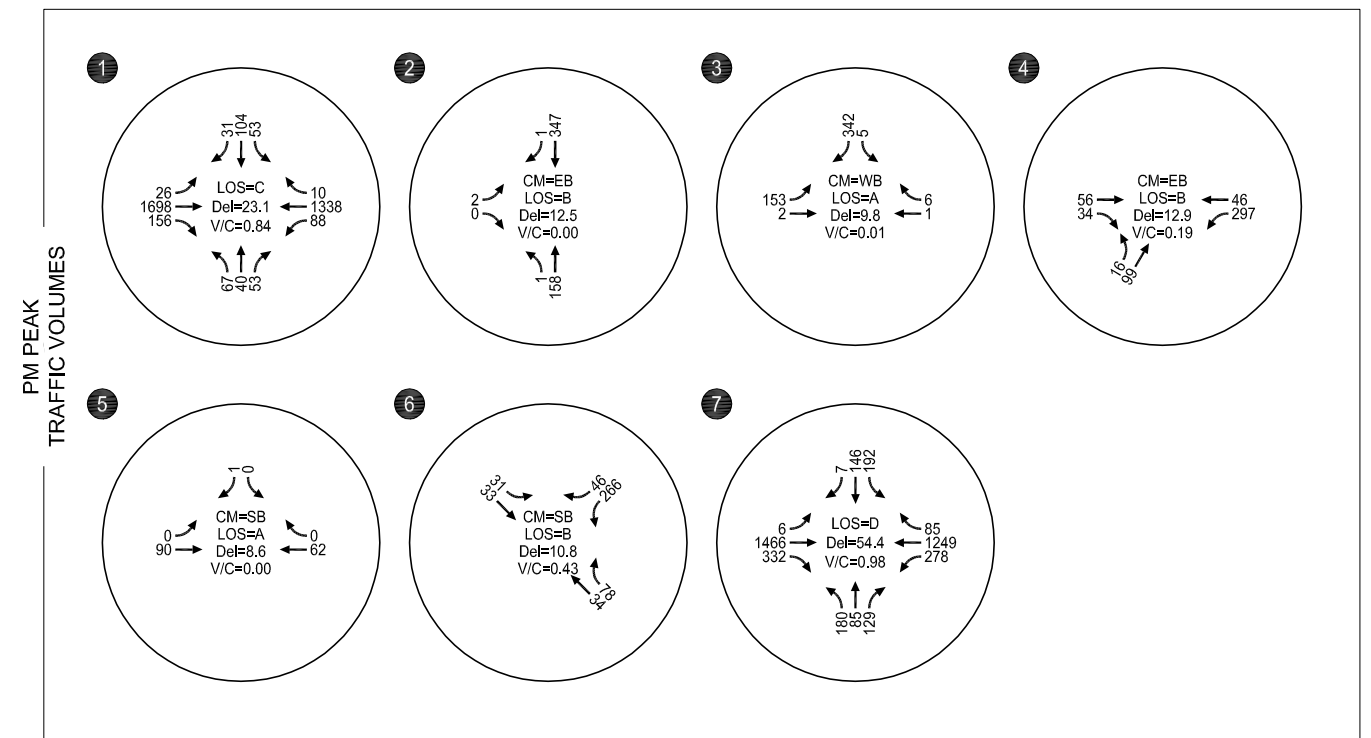
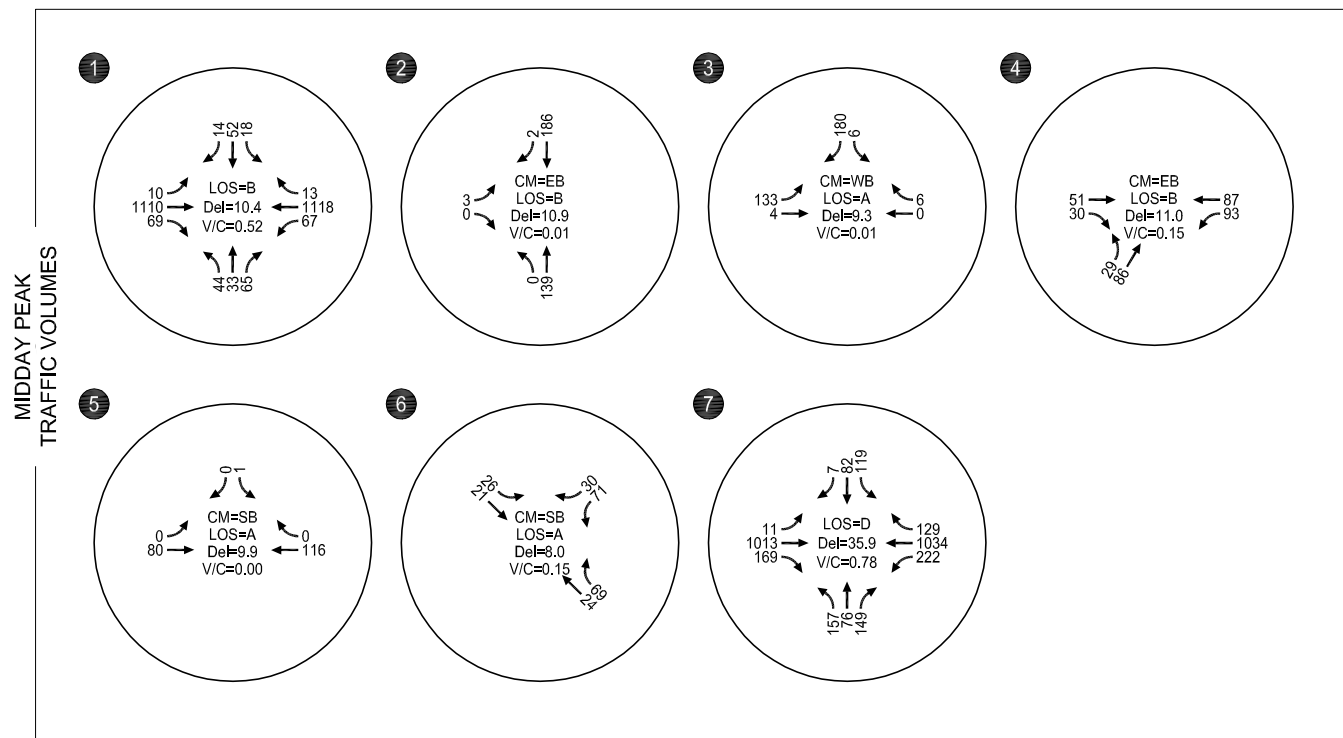
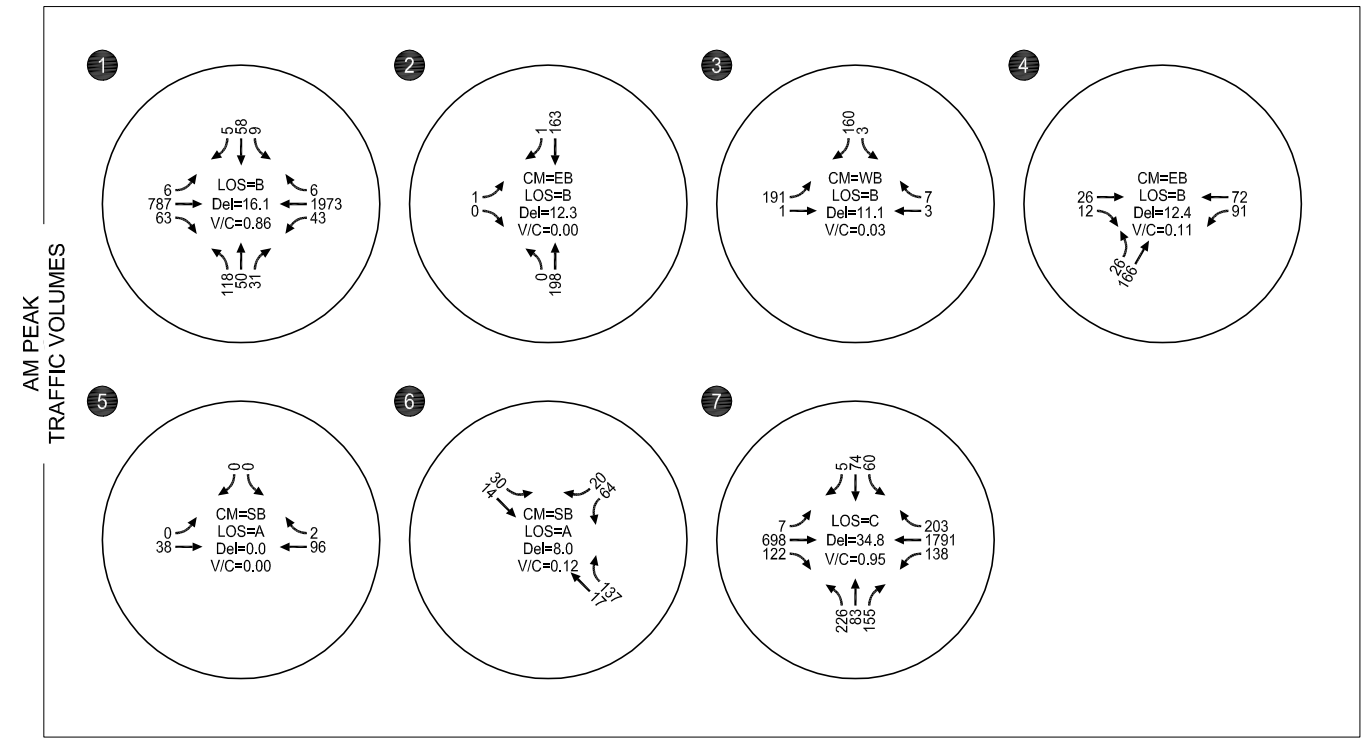
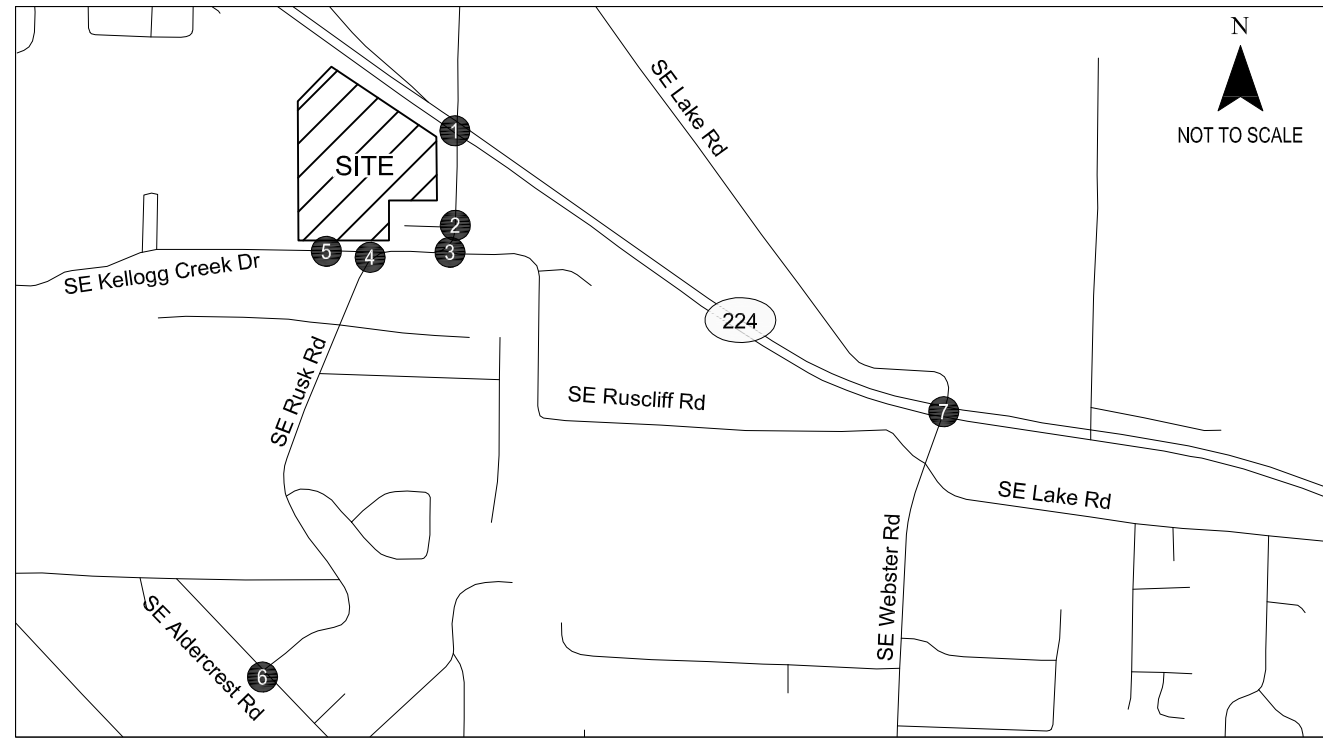
### Trip Generation Estimate

Trip generation estimates associated with the proposed townhomes were developed based on townhome trip rates included in the *Trip Generation Manual, 9<sup>th</sup> Edition* (Institute of Transportation Engineers, 2012) (Reference 11). **Table 6** summarizes the estimated trip generation for the proposed development. Based on direction from Clackamas County, the weekday PM peak hour trip generation rates were used for the weekday midday peak hour estimates as shown in **Table 6**. Midday trip rate data is not available through the *Trip Generation Manual*.

**Table 6. Trip Generation with Development**

Land Use	ITE Code	Size	Total Daily Trips	Weekday AM Peak Hour			Weekday Midday Peak Hour			Weekday PM Peak Hour		
				Total Trips	In	Out	Total Trips	In	Out	Total Trips	In	Out
Townhome	230	92 units	536	40	7	33	48	32	16	48	32	16

<sup>2</sup> Annual traffic growth rate as described in the City of Milwaukie’s *Transportation System Plan*. Chapter 4, page 4-6. November 2013.



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 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO  
 TWSC = TWO-WAY STOP CONTROL  
 AWSC = ALL-WAY STOP CONTROL

2018 Background Traffic Conditions  
 AM, Midday & PM Peak Hours  
 Milwaukie, Oregon

Figure  
 6

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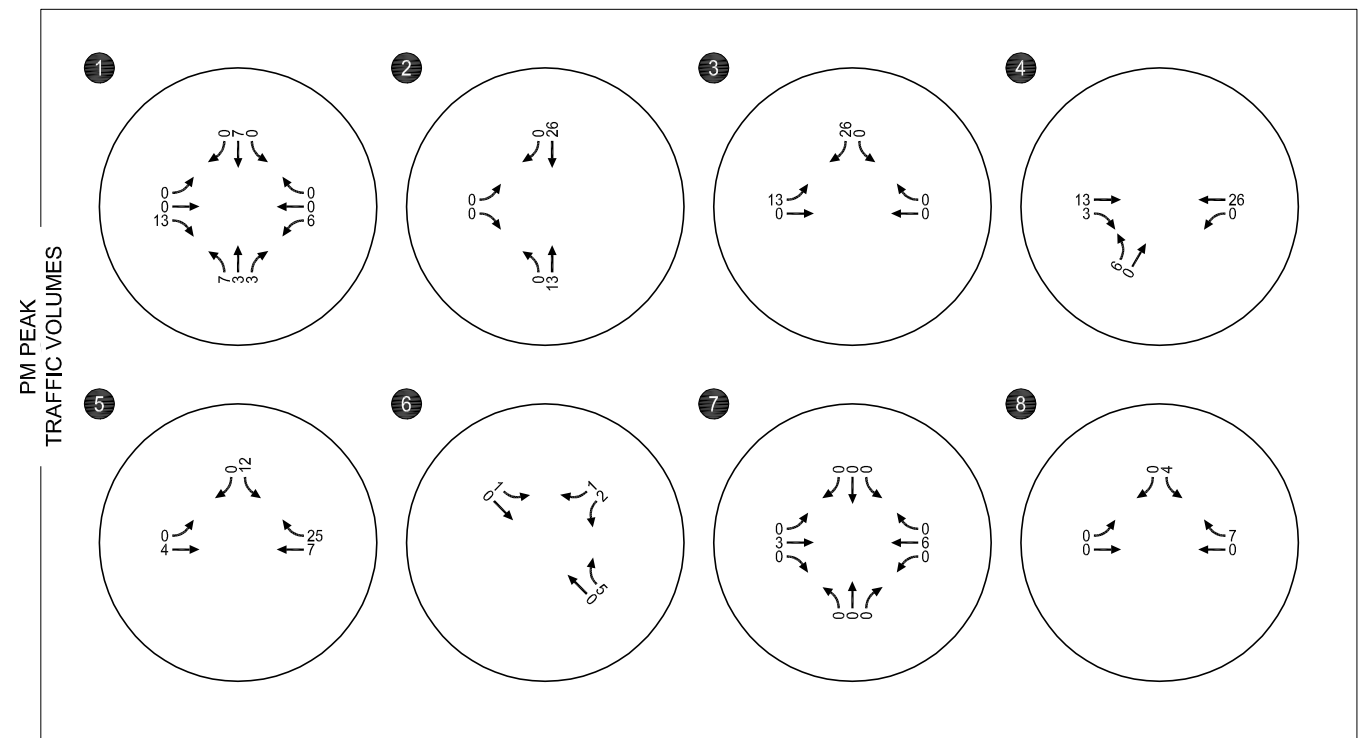
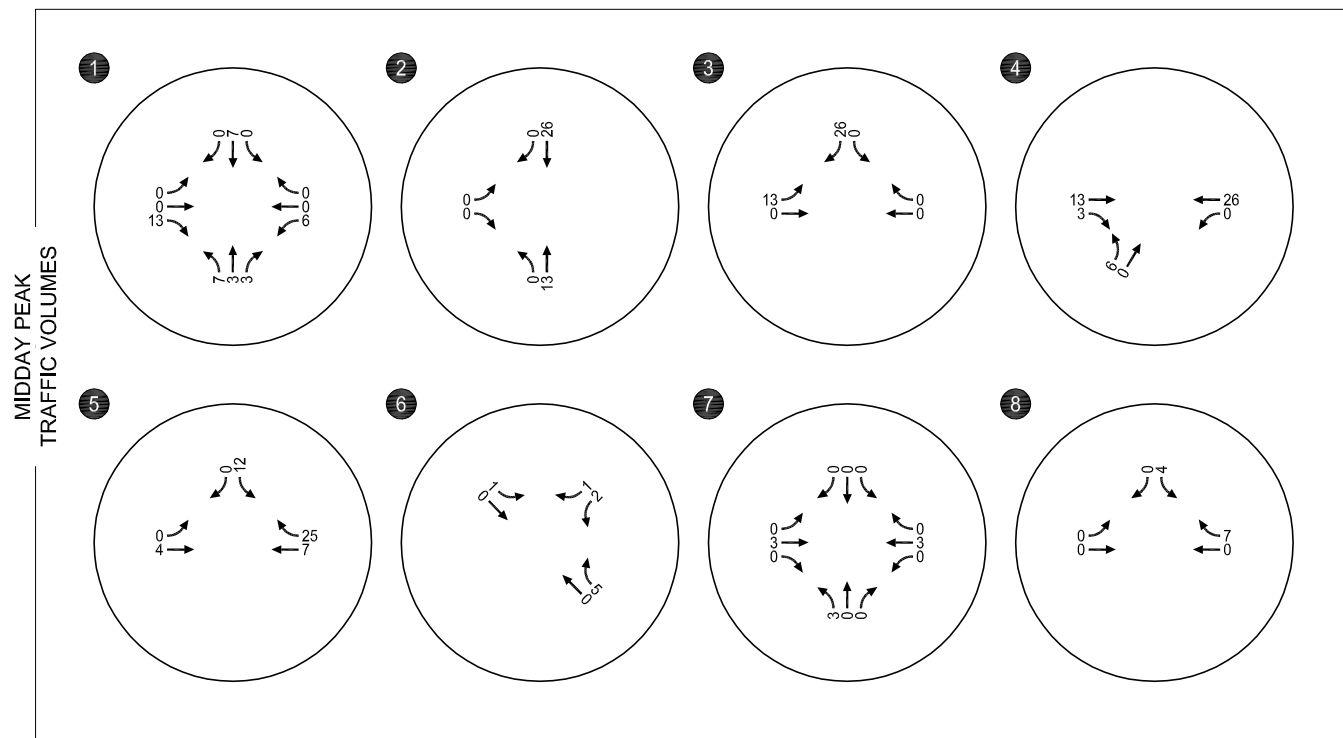
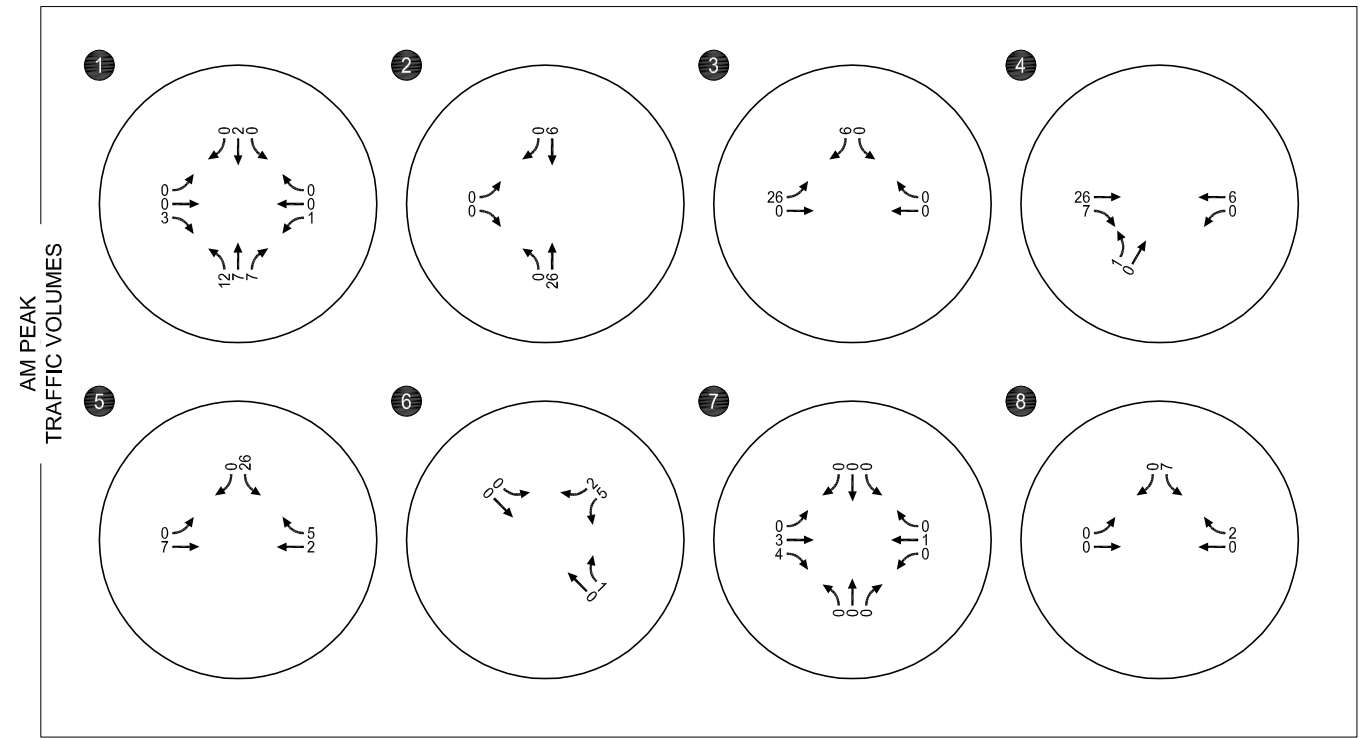
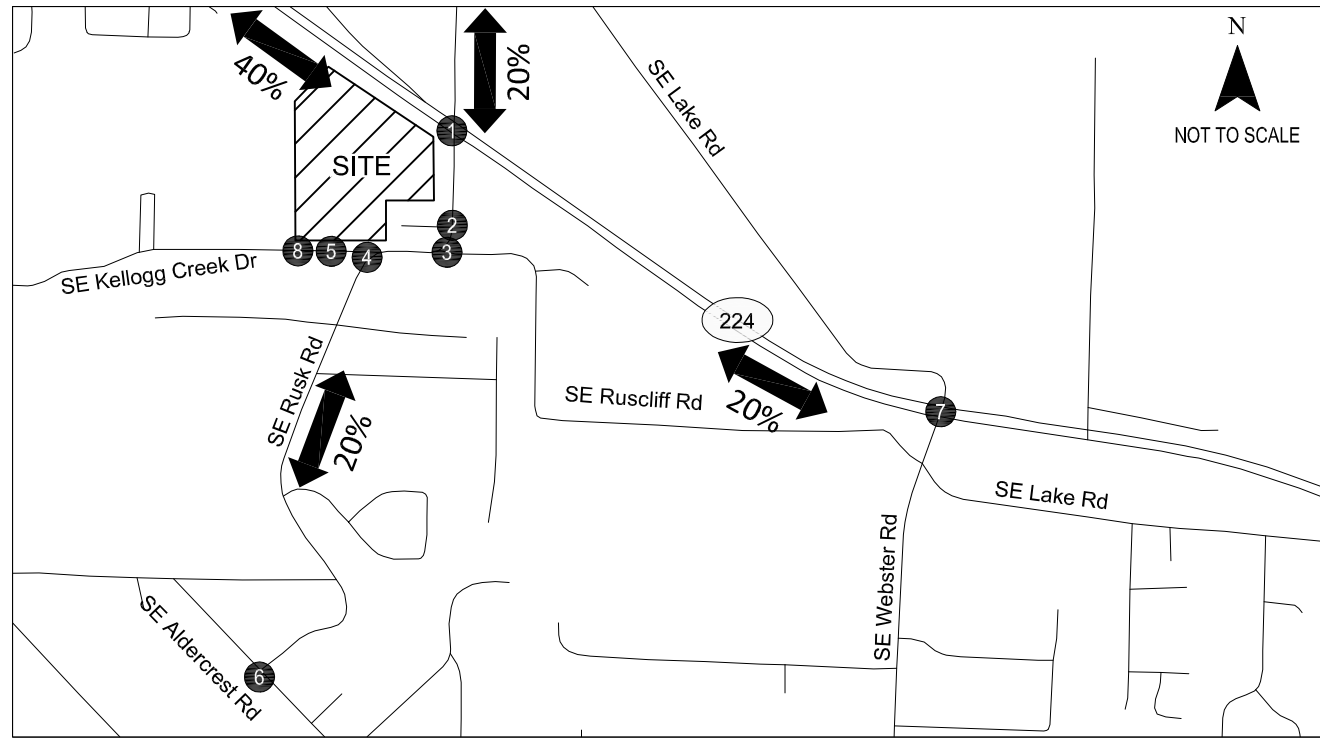
## Trip Distribution/Assignment

A trip distribution pattern was identified for the site considering existing traffic patterns at the study intersections. The traffic assignment at the intersection of OR-224/SE Rusk Road was determined based on the existing trip distribution shown from the turning movements counts collected for the traffic impact study. Approximately 20 percent of site-generated traffic was assigned to travel south on SE Rusk Road, which is approximately the same percentage of existing trips that turn right onto SE Rusk Road from SE Kellogg Creek Drive. Site-generated traffic was assigned to the study intersections based on the estimated distribution pattern. **Figure 7** shows the proposed trip distribution and the net new site-generated trips at each study intersection for the weekday AM, midday, and PM peak hours.

## Year 2018 Total Traffic Conditions

The total traffic conditions analysis forecasts the operation of the study area's transportation system with the inclusion of traffic generated by the proposed site development. Total traffic conditions were determined by adding the estimated site-generated traffic to the year 2018 background volumes for the weekday AM, midday, and PM peak hours. **Figure 8** illustrates the 2018 total traffic conditions and corresponding operational analysis for the weekday AM, midday, and PM peak hours.

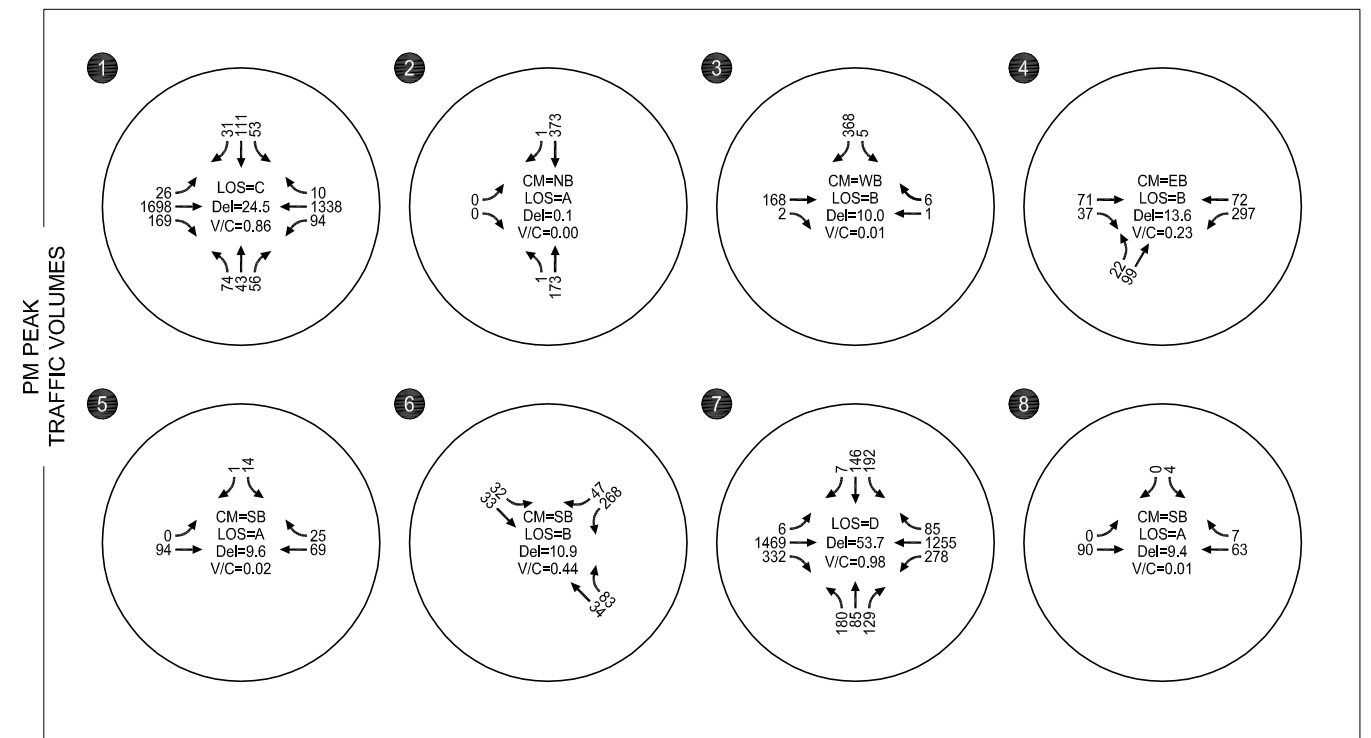
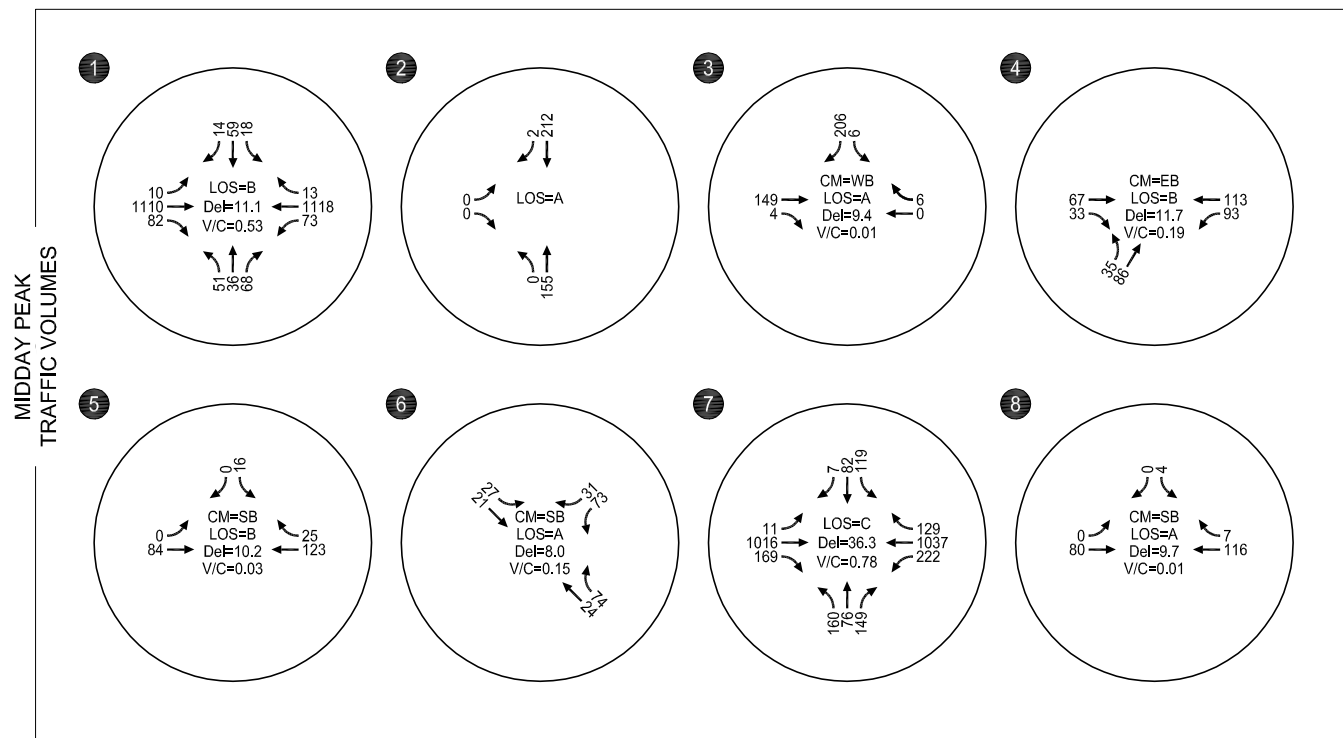
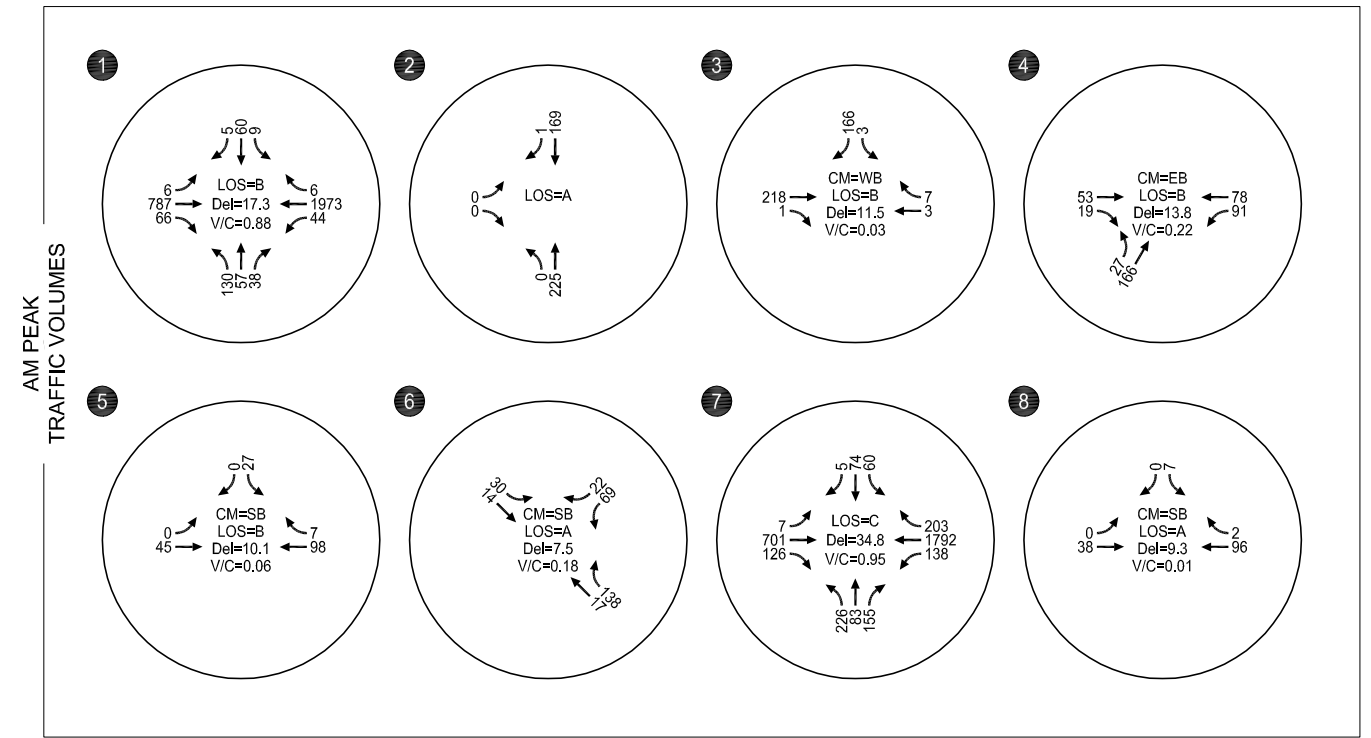
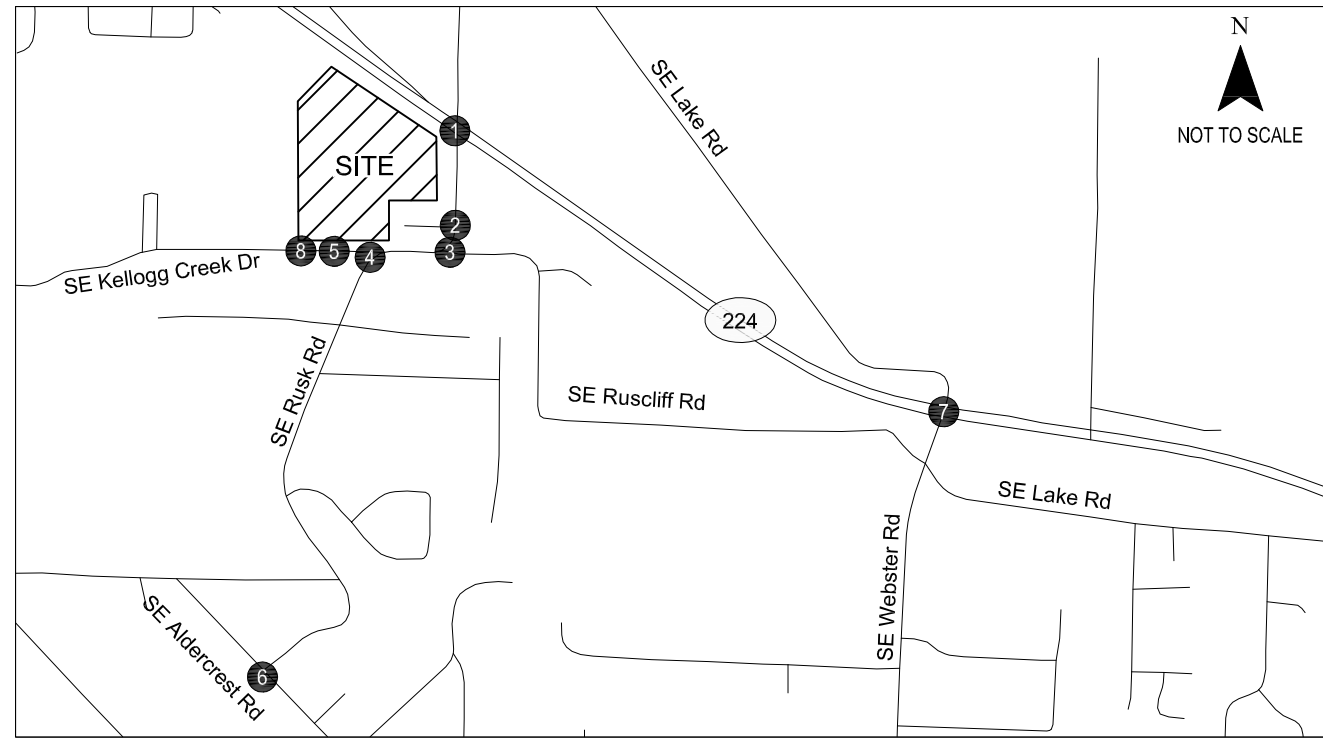
As shown, all of the intersections are expected to continue to satisfy applicable City, County, and ODOT standards under background conditions. The intersection of SE Kellogg Creek Drive/SW Rusk Road would operate at LOS "B" during the weekday AM, midday, and PM peak hours, satisfying the operating standard of LOS "D". In addition, the v/c ratio at this location would be well below the Clackamas County operating standard for the weekday midday and PM peak hours. *Attachment F includes the 2018 total traffic operations analysis worksheets.*



Estimated Trip Distribution Pattern and Site-Generated Trip Assignment  
 AM, Midday & PM Peak Hours  
 Milwaukie, Oregon

Figure  
 7

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CM = CRITICAL MOVEMENT (TWSC)  
 LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)  
 Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)  
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO  
 TWSC = TWO-WAY STOP CONTROL  
 AWSC = ALL-WAY STOP CONTROL

2018 Total Traffic Conditions  
 AM, Midday & PM Peak Hours  
 Milwaukie, Oregon

Figure  
 8

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**Year 2018 Queuing Analysis**

Per Section 19.704.3 and Section 295.16 of the *City of Milwaukie Municipal Code* (Reference 12) and the *Clackamas County Roadway Design Standards*, respectively, 95<sup>th</sup> percentile queuing at the study intersections site were assessed during the weekday AM, midday, and PM peak hours. The results of this 95<sup>th</sup> percentile queue length analysis are included in **Table 7**. As shown in the table, the all but two of the projected 95<sup>th</sup> percentile queues can be accommodated at the study intersections.

**Table 7. Summary of 95<sup>th</sup> Percentile Queues, 2018 Total Traffic Conditions**

Intersection	Movement	Available Queue Storage (feet)	95 <sup>th</sup> Percentile Queue (feet)			Queue Storage Adequate?
			Weekday AM Peak Hour	Weekday Midday Peak Hour	Weekday PM Peak Hour	
OR-224/ SE Rusk Road	EBL	470	25	25	55	Yes
	EBR	110	25	25	80	Yes
	WBL	455	40	95	130	Yes
	WBR	100	0	0	0	Yes
	NBLT	415	265	100	190	Yes
	NBR	50	0	35	35	Yes
	SBLT	745	95	90	205	Yes
	SBR	75	0	0	25	Yes
SE Rusk Road/ SE Ruscliff Road	WBRL	360	25	25	25	Yes
SE Rusk Road/ SE Kellogg Creek Drive	EBLR	> 100	25	25	25	Yes
SE Rusk Road/ East Site Driveway	SBLR	75	25	25	25	Yes
SE Rusk Road/ West Site Driveway	SBLR	75	25	25	25	Yes
SE Rusk Road/ SE Aldercrest Road	EBLT	Continuous	-	-	-	Yes
	WBTR	Continuous	-	-	-	Yes
	SBLR	Continuous	-	-	-	Yes
OR-224/ SE Webster Road	EBL	500	25	25	25	Yes
	EBR	360	25	115	130	Yes
	WBL	295	175	220	410	No
	WBR	150	70	35	25	Yes
	NBL	155	360	215	290	No
	SBL	330	105	150	315	Yes

Where: EB = eastbound, WB = westbound, NB = northbound, SB = southbound, L = left-turn, T= through, R = right-turn

As shown in **Table 7**, all 95<sup>th</sup> percentile queues during year 2018 total traffic conditions would be accommodated by the available storage with the exception of the westbound left-turn lane on OR-224 at SE Webster Road during the weekday PM peak hour and the northbound left-turn lane on OR-224 at SE Webster Road during all three weekday peak hours.

The westbound left-turn on OR-224 at SE Webster Road currently exceeds the available storage during existing weekday PM peak hour conditions as well as year 2018 background conditions. The

westbound left-turn 95<sup>th</sup> percentile queue during the weekday PM peak hour year 2018 background conditions is estimated at approximately 410 feet long. The proposed development would not add any additional vehicles to the westbound left-turn movement during the weekday PM peak hour under year 2018 total traffic conditions and the 95<sup>th</sup> percentile queue length would not be expected to increase as a function of site development.

The northbound left-turn on OR-224 at SE Webster Road currently exceeds the available storage during all three existing peak hour conditions and extends south of the signalized intersection of SE Webster Road/SE Lake Road. The reported available storage (155 feet) was measured as the distance between the OR-224/SE Webster Road intersection and SE Webster Road/SE Lake Road, the intersection to the south. The 95<sup>th</sup> percentile queue would continue to exceed the available storage during all three peak hour year 2018 background conditions. The proposed development would add three additional vehicles to the northbound left-turn movement under year 2018 total traffic conditions during the weekday midday peak hour and the 95<sup>th</sup> percentile queue length would be expected to increase by less than a vehicle length as a function of site development.

### Intersection Sight Distance

Section 240 of the *Clackamas County Roadway Design Standards* (Reference 9) establishes the intersection sight distance requirements associated with the proposed driveways along SE Kellogg Creek Drive. Per Table 2-6 of Section 240 of the *Clackamas County Roadway Design Standards*, an intersection sight distance of 335 feet shall be provided for a left turn from a stop on a road with a 30 mile per hour design speed (posted 25 mph speed).

Intersection sight distance was observed at the proposed west site driveway on SE Kellogg Creek Drive and was found to be in excess of 400 feet in both directions, which would satisfy the County standard. Intersection sight distance was observed at the proposed east site driveway on SE Kellogg Creek Drive and was found to be at least 400 feet to the west and at least 400 feet to the east for vehicles traveling west on SE Rusk Road. However, sight distance for a southbound left-turn at the driveway would be approximately 300 feet facing east towards a vehicle northbound on SE Rusk Road turning left onto SE Kellogg Creek Drive. The northbound left-turn vehicles on SE Rusk Road are required to yield to southbound vehicles on SE Rusk Road. Based on a field review of traffic and vehicular speeds entering SE Kellogg Creek Drive from SE Rusk Road, 300 feet is sufficient intersection sight distance for the southbound left-turn at the driveway because vehicles negotiating a left turn onto SE Kellogg Creek Drive would be operating at less than 20 miles per hour. The 25-foot radius of the curve corresponds to a design speed of approximately 11 miles per hour (NCHRP Report 6-72, Reference 15). Furthermore, the required minimum stopping sight distance for a northbound left-turn vehicle traveling at 20 miles per hour is 115 feet per Table 2-10 of Section 240 of the *Clackamas County Roadway Design Standards*, which will be satisfied.

### Analysis of Access Standards

Per Section 12.16.040 of the *City of Milwaukie Municipal Code* (Reference 12) driveway access to the nearest intersecting street face shall be a minimum of 45 feet. The nearest proposed driveway on SE

Kellogg Creek Drive is located approximately 275 feet from SE Rusk Road, which satisfies the City standard.

### Evaluation of Compliance with Metro RTFP Requirements

Metro's *Regional Transportation Functional Plan* (RTFP) (Reference 13) describes the requirements for developable lots and parcels of five or more acres in Sections 3.08.110.D and 3.08.110.E. In regards to Subsection D, the proposed development identifies a logical and direct connection to the public street system at SE Kellogg Creek Drive. In regards to Subsection E, the proposed development will be providing street connections that are no more than 530 feet between connections, and a cul-de-sac design that is limited to connect to the existing street system because of an existing barrier (OR-224), is less than 200 feet in length, and contains fewer than 25 dwellings.

### TRANSPORTATION PLANNING RULE (TPR) COMPLIANCE

The TPR implements Statewide Planning Goal 12, "Transportation." OAR Section 660-012-0060(1) and (2) apply to zoning map changes. OAR 660-012-0060(9) exempts zoning map amendments in cities with acknowledge transportation system plans ("TSPs") that implement the plan map designations. This section addresses both requirements.

OAR 660-012-0060(1) and (2) established a two-step process for evaluating an amendment's impacts on roadway facilities. The first step in assessing an amendment's potential transportation impact is to compare the trip generation potential of the site assuming a "reasonable worst-case" development scenario under the existing and proposed zoning. If the trip generation potential increases under the proposed zoning, additional operational analysis is required to assess whether the rezone will "significantly affect" the transportation system. Conversely, if the trip generation under the proposed zoning is equal to or less than that under the existing zoning, no additional operational analysis is necessary to conclude that the proposal does not "significantly affect" the transportation system.

### Zoning Map Amendment

Under the City of Milwaukie's current zoning code, the existing site is allowed to develop 96 units of townhome housing. The Applicant proposes to develop 92 units using a Planned Development (PD) process that increases the site density but retains the existing Comprehensive Plan designation. Therefore, further operations assessment under TPR is not necessary.



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## FINDINGS AND RECOMMENDATIONS

Based on the results of the traffic impact analysis, the proposed development can be constructed while maintaining acceptable operations at the study intersections. The analysis developed the following findings and recommendations.

### Findings

- All study intersections are forecast to operate within the applicable review agency operational standards under existing and site opening year 2018 scenarios studied during the weekday AM, midday, and PM peak hours.
- Historical crash data for the study area intersections indicate no patterns or trends that require mitigation associated with this project.
- Projected 95<sup>th</sup> percentile queues can be accommodated within the existing storage areas at the study intersections, with the exception of the intersection of OR-224/SE Webster Road, where existing and background weekday peak hour 95<sup>th</sup> percentile queues exceed the available storage for the westbound left-turn (weekday PM peak hour) and the northbound left-turn (weekday AM, midday, and PM peak hours).
- Landscaping, signage, and utilities should be located and maintained to ensure adequate intersection sight lines are available.
- The proposed zoning map amendment with site development does not result in a net increase in the overall trip generation potential of the site on a daily or weekday peak hour basis above what is allowed by the City of Milwaukie's Comprehensive Plan.
- The proposed zoning map amendment will not require changes to the functional classification of existing or planned transportation facilities, will not require a change to the standards implementing the comprehensive plan, and will not significantly affect a transportation facility. Accordingly, because the proposed zoning map amendment does not increase the density of the site above what is allowed by the City of Milwaukie's Comprehensive Plan or result in a significant effect on the transportation system, no review of mitigation for Transportation Planning Rule (TPR) purposes is necessary.

### Recommendations

- Regardless of the proposed development, "DO NOT ENTER" and/or "ONE WAY" signs should be installed per the MUTCD at the SE Rusk Road/Church driveway to restrict vehicles from exiting the church driveway onto SE Rusk Road. In addition, the driveway should be modified so that only one-way ingress is allowed.

Recommended transportation improvements to mitigate the direct impacts of the site development include the following:

- Standard half-street improvements should be constructed along the site frontage on SE Kellogg Creek Drive, and standard full-street improvements along new on-site roadways.
- Intersection sight distance should be provided at the proposed new site accesses per applicable City of Milwaukie, and Clackamas County design requirements. Landscaping, above ground utilities, and signing should be located and maintained in a manner that preserves adequate intersection sight distance.

Please contact us if you need any additional information regarding our analyses.

## REFERENCES

1. Transportation Research Board. *2000 Highway Capacity Manual*. 2000.
2. *City of Milwaukie Transportation System Plan*. November 2013.
3. *Clackamas County Comprehensive Plan*. Amended March 1, 2014.
4. Oregon Department of Transportation. *1999 Oregon Highway Plan*. Amended May 2015.
5. TriMet. "Bus Services." Accessed on-line at [www.trimet.org](http://www.trimet.org). November 2016.
6. Safe Walk Paths to School. North Clackamas School District. Last modified November 2015. Accessed November 2016.
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8. American Association of State Highway and Transportation Officials. *Highway Safety Manual*. 2010.
9. *Clackamas County Roadway Design Standards*. February, 2013
10. *Manual on Uniform Traffic Control Devices*. USDOT, Federal Highway Administration. 2009, Revision 2, May 2012.
11. Institute of Transportation Engineers. *Trip Generation, 9<sup>th</sup> Edition*. 2012.
12. *City of Milwaukie Municipal Code*. Last modified in 2009. Accessed November 2016.
13. *Regional Transportation Functional Plan*. Metro. September 2012. Accessed December 2016.

14. Metro Exhibit A to Ordinance No 14-1340, *Technical Appendix for the Regional Transportation Plan*, Adopted July 17, 2014, Appendix 1.1 – 2014 RTP Project List
15. Transportation Research Board of the National Academies. *National Cooperative Highway Research Program (NCHRP) Report 672 Roundabouts: An Informational Guide*. Exhibit 6-52, Speed-Radius Relationship. Page 6-57.

## ATTACHMENTS

Attachment A – Description of Level-of-Service and Volume-to-Capacity Methods and Criteria

Attachment B – Crash Data

Attachment C – Traffic Count Data

Attachment D – Existing Traffic Level-of-Service Worksheets

Attachment E – 2018 Background Traffic Level-of-Service Worksheets

Attachment F – 2018 Total Traffic Level-of-Service Worksheets

