

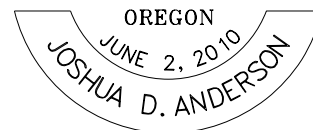
Eagle Landing Traffic Impact Study

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Prepared by:



David Evans and Associates, Inc.
2100 SW River Parkway
Portland, OR 97201



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1. Introduction

In 1998, Clackamas County approved a comprehensive plan and zone change on approximately 60 acres that were then occupied by the Top O' Scott Golf Course for a mixed-use development known as Eagle Landing. The Eagle Landing project included single-family residential, multi-family residential, office/commercial, and supportive retail uses. In addition, the project included significant improvement to and dedication of public facilities, including major roadways, trails, and open space amenities.

The comprehensive plan and zone map amendments approved by the County in 1998 included conditions of approval that affected project timing by requiring the completion of several new Clackamas Regional Center (CRC) area roads before the Eagle Landing development could take place. These public transportation projects included:

I-205 Frontage Road and Monterey Avenue Over crossing	Completed
Sunnybrook Road Extension	Completed
I-205/Sunnyside Road Split Diamond Interchange	Completed
Sunnyside Road widening from I-205 to 122 nd Avenue	Completed

In January 2003, the applicant secured a modification to the conditions of approval because construction of the public roads was assured. The modification resulted in the property being rezoned, which removed obstacles to securing financing for on-site improvements. With those changes, the project moved forward with development of a master plan.

David Evans and Associates, Inc. (DEA) conducted the Eagle Landing transportation analysis for the original 1998 land use application and the 2003 traffic analysis. These studies demonstrated that under expected build-out conditions, with all public and privately financed transportation improvements in place, traffic from the Eagle Landing mixed-use development would meet the County's adopted transportation level of service standards.

Since then, the developers have acquired more land to the west of what is now considered Eagle Landing. The New Hope Church and a small one-level apartment complex currently occupy this land. Given that there are proposed changes to the mix of use and addition of uses, the original traffic analysis conclusions no longer hold true. In 2012, the entirety of the property was rezoned to allow for build-out of 2.1 million square feet of mixed-use development. Conditions of approval that identified transportation infrastructure improvements were imposed upon the project as part of the re-zone process. Those infrastructure improvements have yet to be constructed.

This Traffic Impact Study (TIS) is intended to study the currently proposed build-out scenario for the Eagle Landing area to the east of Stevens Road in the expected opening year of 2021. While this analysis does not include the full 2.1 million square feet as envisioned in the zone change analysis, it also does not preclude the eventual construction of the ultimate buildout of the Eagle Landing mixed-use development. This TIS is seeking Master Planning approval for an aggregate of approximately 695,000 square feet of mixed-use development. The study area has been expanded from previous studies to include additional State and City of Happy Valley intersections and roadways. DEA will show that the existing roadway network can support the additional traffic generated by the development of 695,000 square feet of the Eagle Landing mixed-use project. The study area intersections are expected to meet the County, City of Happy Valley and State adopted transportation performance standards.

1.1. Study Area

The Eagle Landing study area lies wholly in Clackamas County and partially in the City of Happy Valley in the southeast quadrant of the Portland Metropolitan Area (see **Figure 1**). Johnson Creek Boulevard bounds the study area to the north, Sunnybrook Boulevard to the south, 82nd Avenue to the west, and Valley View Terrace to the east (roads are all SE prefix).

Figure 1. Study Intersections and Governing Jurisdiction



2. Analysis Parameters

2.1. Performance Standards

ODOT, Clackamas County, and the City of Happy Valley all maintain separate performance standards that apply to the Eagle Landing Traffic Impact Study. **Figure 1** (Page 2) depicts the governing jurisdiction for each intersection within the Eagle Landing study area.

2.1.1. Happy Valley

According to Policy 5a of the Happy Valley Transportation System Plan (Adopted in September 2014):

- All signalized intersections shall operate at level of service D and V/C ratio of 0.90 or better during the peak hours of analysis. Individual movements must meet level of service E and a V/C ratio of 1.0. (Does not apply; no city intersections are signalized.)
- All roundabout intersections shall operate at level of service D or better during the peak hours of analysis. Each approach must meet level of service E and a V/C ratio of 0.85.
- All unsignalized two-way stop controlled intersections shall operate at level of service E or better (based on average approach delay) for all side street approaches during the peak hours of analysis.
- All unsignalized all-way stop controlled intersections shall operate at level of service D or better based on average intersection delay during the peak hours of analysis.

2.1.2. Clackamas County

As peak hour traffic operations have neared and reached capacity at times along Sunnyside Road, Clackamas County staff has focused on evaluating volume to capacity ratios (V/C) as the performance standard.

In addition to its typical operational standards, Clackamas County has separate operational standards specific to intersections within the CRC. The majority of the Eagle Landing study area falls within the CRC boundary except for the intersection of Sunnyside Road at Valley View Terrace and the intersections between the site and the Jackson School Interchange to the north. Within the CRC, Clackamas County follows the two-hour V/C standard for regional centers outlined in chapter five of Clackamas County's Comprehensive Plan. The standard specifies that within the CRC, signalized and unsignalized traffic may operate with a maximum PM peak hour V/C ratio of 1.10, a maximum PM side hour (2nd peak hour) and Midday peak hour V/C ratio of 0.99. Outside of the CRC, Clackamas County allows a maximum PM peak hour and side hour V/C ratio of 0.99, with a maximum Midday peak hour V/C ratio of 0.90.

2.1.3. ODOT

ODOT maintains jurisdiction over ramp terminals serving I-205 as well as intersections along 82nd Avenue. The 1999 Oregon Highway Plan (OHP) states that ramp terminals must operate with a volume-to-capacity (V/C) ratio at or below 0.85. At a V/C of 0.85, off-ramp queuing should also be short enough such that traffic leaving the freeway can safely stop before reaching any queued traffic. The OHP does allow V/C ratios to be above 0.90 when it can be shown through the analysis that the 95th percentile queuing estimates do not extend back into the safe deceleration area from the mainline. Within the study area, 82nd Avenue is within the CRC Regional Center boundary, as such, the OHP allows for a maximum V/C ratio of 1.1 during the peak hour and a maximum V/C ratio on 0.99 during the 2nd Hour of the AM and PM peak periods.

2.1.4. Summary of Study Area Performance Standards

The applicable performance standard by intersection and time period is summarized for each study area intersection in **Table 1** below.

Table 1. City, County and State Performance Standards

Intersection		Jurisdiction	Standard ^{1,2,3}		
			AM	MD	PM
Study Area Intersections					
1	I-205 SB at Johnson Cr Blvd Signalized (Ramp Terminal)	State ⁴	V/C <= 0.85		V/C <= 0.85
		County			V/C <= 0.99
2	I-205 NB at Johnson Cr Blvd Signalized (Ramp Terminal)	State ⁴	V/C <= 0.85		V/C <= 0.85
		County			V/C <= 0.99
3	Johnson Cr Blvd at 92nd Ave Signalized	County		V/C <= 0.90	V/C <= 0.99
4	Bob Schumacher Rd/92 nd Ave at Otty Rd/Idleman Rd Signalized	County		V/C <= 0.90	V/C <= 0.99
5	92nd Ave at Idleman Rd Unsignalized (NB Stop)	County		V/C <= 0.90	V/C <= 0.99
6	Stevens Rd at Hillcrest Rd Unsignalized (All Way Stop)	County		V/C <= 0.90	V/C <= 0.99
7	Bob Schumacher Rd at Causey Ave Signalized	County		V/C <= 0.99	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
8	Stevens Rd at Causey Ave Unsignalized (EB/WB Stop (2016); All Way Stop (2021))	City	Peak Hr: LOS E (for all side street approaches); LOS D		Peak Hr: LOS E (for all side street approaches); LOS D
9	Monterey Ave at William Otty Rd Roundabout	City	Peak Hr: LOS D (overall), LOS E (each approach), V/C <= 0.85		Peak Hr: LOS D (overall), LOS E (each approach), V/C <= 0.85
10	Valley View Terr at William Otty Rd Unsignalized (All Way Stop)	City	Peak Hr: LOS D		Peak Hr: LOS D
11	82nd Ave at Monterey Ave Signalized	State	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99		1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
		County		V/C <= 0.99	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
12	Bob Schumacher Rd at Monterey Ave Signalized	County		V/C <= 0.99	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
13	Stevens Rd at Monterey Ave Roundabout	City	Peak Hr: LOS D (overall), LOS E (each approach), V/C <= 0.85		Peak Hr: LOS D (overall), LOS E (each approach), V/C <= 0.85
14	Stevens Rd at Apartment Driveway Unsignalized (EB Stop)	City	Peak Hr: LOS E (for all side street approaches)		Peak Hr: LOS E (for all side street approaches)

Table 1. City, County and State Performance Standards

Intersection		Jurisdiction	Standard ^{1,2,3}		
			AM	MD	PM
15	Stevens Rd at Bob Schumacher Rd Signalized	County		V/C <= 0.99	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
16	Stevens Rd at Shopping Center Signalized	County		V/C <= 0.99	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
17	82nd Ave at Sunnyside Rd Signalized	State	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99		1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
		County		V/C <= 0.99	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
18	93rd Ave at Sunnyside Rd Signalized	County		V/C <= 0.99	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
19	I-205 SB at Sunnyside Rd Signalized (Ramp Terminal)	State ⁴	V/C <= 0.85		V/C <= 0.85
		County		V/C <= 0.99	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
20	I-205 NB at Sunnyside Rd Signalized (Ramp Terminal)	State ⁴	V/C <= 0.85		V/C <= 0.85
		County		V/C <= 0.99	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
21	Sunnyside Rd at Stevens Rd Signalized	County		V/C <= 0.99	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
22	Valley View Terr at Sunnyside Rd Signalized	County		V/C <= 0.90	V/C <= 0.99
23	82nd Ave at Sunnybrook Blvd Signalized	State	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99		1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
		County			1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
24	I-205 SB at Sunnybrook Blvd Signalized (Ramp Terminal)	State ⁴	V/C <= 0.85		V/C <= 0.85
		County		V/C <= 0.99	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99
25	I-205 NB at Sunnybrook Blvd Signalized (Ramp Terminal)	State ⁴	V/C <= 0.85		V/C <= 0.85
		County		V/C <= 0.99	1 st Peak Hr: V/C <= 1.1 2 nd Peak Hr: V/C <= 0.99

Table 1. City, County and State Performance Standards

Intersection		Jurisdiction	Standard ^{1,2,3}		
			AM	MD	PM
Study Area Access Points					
A	Monterey Ave at Access A Unsignalized, NB stop controlled	City	Peak Hr: LOS E (for all side street approaches)		Peak Hr: LOS E (for all side street approaches)
B	Monterey Ave at Access B Unsignalized, NB stop controlled	City	Peak Hr: LOS E (for all side street approaches)		Peak Hr: LOS E (for all side street approaches)
C	Monterey Ave at Access C Unsignalized, NB stop controlled	City	Peak Hr: LOS E (for all side street approaches)		Peak Hr: LOS E (for all side street approaches)
D	Monterey Ave at Access D Unsignalized NB stop controlled	City	Peak Hr: LOS E (for all side street approaches)		Peak Hr: LOS E (for all side street approaches)
E	Monterey Ave at Access E Unsignalized, WB stop controlled	City	Peak Hr: LOS E (for all side street approaches)		Peak Hr: LOS E (for all side street approaches)

NOTES:

1. State standards obtained from the 1999 Oregon Highway Plan Action 1F.1 and Table 7.
2. County standards obtained from the Clackamas County Comprehensive Plan Table 5-2a (chapter 5).
3. City standards obtained from Chapter 1 of the Happy Valley Transportation System Plan, pg. 1-10.
4. ODOT Ramp terminals may reference a 0.90 v/c or below if queuing is shown to not affect the safe deceleration area.

2.2. Synchro/SimTraffic Model

The Synchro software is based upon procedures outlined in the *2000 and 2010 Highway Capacity Manuals* (HCM) for intersections and arterials and explicitly evaluates traffic operations under a coordinated system of signalized intersections. It also calculates traffic arrival types, calculates right-turn-on-red capacity, and determines average and maximum expected queue lengths. SimTraffic animates corridor traffic conditions where traffic may spill over from one intersection to another.

The Synchro/SimTraffic analysis software was selected to perform the intersection analysis as it can provide the V/C ratio and LOS output of an HCM analysis and consider the systematic interaction of the intersections with regard to queuing and delays. For signalized intersections, operations will be reported using HCM 2000 methodology as HCM 2010 does not report an overall intersection V/C ratio. HCM 2010 will be used for unsignalized intersections as the metrics for the unsignalized operations are reported in the HCM 2010 reports. For the SimTraffic analysis, seven runs of the model were completed. ODOT standard is to average together at least five random acceptably working (no system gridlock) runs. To allow for “blown” runs, the most and least congested of the seven runs were thrown out and the remaining five were averaged. SimTraffic was used to determine 95th percentile queue lengths.

3. Existing (2016) Conditions

3.1. Existing Roadway Facilities

For this study, DEA focused its analysis on roadways that would directly serve the currently proposed Eagle Landing development as well as secondary roadways that could potentially be impacted. The study area intersections were selected with input from City and County staff. **Table 2** summarizes the transportation facilities within the study area and their characteristics.

The relevant arterial roadways within the study area are Johnson Creek Boulevard, Sunnyside Road, Sunnybrook Boulevard, Stevens Road, Bob Schumacher Road, Monterey Avenue, 92nd Avenue, and 82nd Avenue. All the study area arterials are important corridors for access to/from the Greater Clackamas Regional Center/Industrial Area.

The study intersections are along arterial as well as collector roadways. The applicable collector routes within the study area are Causey Road, William Otty Road, Valley View Terrace, and sections of Stevens Road. These collector routes are important for moving traffic from local streets to arterial roads. Bob Schumacher Road/Stevens Road serves as a route between the Clackamas Town Center and Sunnyside Road, as well as serving the adjacent commercial land uses.

The study area intersections also include streets that are part of the local network. The short section of Monterey Avenue (east of Stevens Road) is a neighborhood roadway. This local road is expected to provide direct access to the proposed Eagle Landing development.

Table 2. Existing Roadway Characteristics

Street	Classification	Lanes	Posted Speed (MPH)	Bicycle Lanes	Sidewalks
Johnson Cr Blvd: I-205 SB Ramps to 92 nd Ave	Major/Minor Arterial	5	35	Partial	Partial
Otty Rd: I-205 Overpass to 92 nd Ave	Collector	3	35	Yes	Yes
Idleman Rd: 92 nd Ave to 94 th Ave	Collector	3	35	Yes	Yes
Hillcrest Rd: 92 nd Ct to 100 th Ave	Local	2	25	No	Partial
Causey Ave: Bob Schumacher Rd to Monterey Ave	Collector	3	30	Yes	Partial
William Otty Rd: Monterey Ave to Valley View Terr	Collector	2	25	Yes	Yes
Monterey Ave					
82 nd Ave to I-205 Overpass	Minor Arterial	3	25	Yes	Yes
Stevens Rd to William Otty Rd	Collector	3	30	Yes	Yes
Sunnyside Rd					
82 nd Ave to I-205 Overpass	Major Arterial	8	40	No	Yes
I-205 Overpass	Major Arterial	6	40	No	Yes
I-205 NB Ramps to Stevens	Major Arterial	6	40	Yes	Yes
Stevens Rd to 106 th	Major Arterial	5	40	Yes	Yes
East of 106 th Ave	Major Arterial	6	40	Yes	Yes
Sunnybrook Blvd					
82 nd Ave to 93 rd Ave	Major Arterial	5	35	Yes	Yes
93 rd Ave to 97 th Ave (I-205 Overpass)	Major Arterial	6	35	Yes	Yes
97 th Ave to Sunnyside Rd	Major Arterial	4	40	Yes	Partial
82 nd Ave					
Monterey Ave to McBride St	Principal Arterial	5	35	Yes	Yes
McBride St to Sunnybrook Blvd	Principal Arterial	5	45	Yes	Yes
93 rd Ave: South of Sunnyside Rd	Collector	3	25	No	Yes
I-205 Ramps at Johnson Cr Blvd					
I-205 SB	Interstate	1	45	No	No
I-205 NB	Interstate	1	35	No	No
I-205 Ramps at Sunnyside Rd					
I-205 SB	Interstate	1	45	No	No
I-205 NB	Interstate	1	45	No	No
I-205 Ramps at Sunnybrook Blvd					
I-205 SB	Interstate	1-2	45	No	No
I-205 NB	Interstate	1-2	45	No	No
Bob Schumacher Rd					
Otty Rd/Idleman Rd to Causey Ave	Minor Arterial	2	40	Yes	Partial
Causey Ave to Monterey Ave	Minor Arterial	2	40	Yes	Partial
Monterey Ave to Stevens Rd	Minor Arterial	4	40	Yes	Yes
92 nd Ave					
Johnson Cr Blvd to Otty Rd/Idleman Rd to	Collector	3	35	Yes	Yes
Idleman Rd to Stevens Wy	Collector	2	30	Partial	Partial
Stevens Rd					
92 nd Ave to Causey Ave	Collector	2	30	Yes	No
Causey Ave to Bob Schumacher Rd	Collector	3	30	Yes	Partial
Bob Schumacher Rd to Sunnyside Rd	Minor Arterial	5	35	Yes	Yes
Valley View Terr: William Otty Rd to Sunnyside Rd	Collector	2	25	No	Partial

3.2. Transit Facilities

Currently the TriMet MAX Green Line and ten Tri-Met bus routes serve the study area; all are wheelchair-accessible. The existing transit routes/service levels within the study area are summarized below, followed by the eight other Tri-Met bus routes servicing the Clackamas Town Center (CTC).

Route 156. Bus route 156 provides access between CTC Transit Center and the Mark O. Hatfield Transit Plaza (147th & Sunnyside Road). Of the study area roadways, it travels on Monterey Avenue, Bob Schumacher Road, Sunnyside Road and Sunnybrook Boulevard. Route 156 only offers service on weekdays and operates on 80-minute headways.

Route 29. Bus route 29 provides access between Milwaukie Transit Center and CTC Transit Center and travels on 82nd Avenue and Monterey Avenue within the study area. Route 29 only offers service on weekdays. It operates on 62-minute headways during the morning and 80-minute headways.

Route 155. Bus route 155 provides access between CTC Transit Center and 157th & Sunnyside Road via Sunnyside Road. Route 155 operates on 30-minute headways on weekdays and 40-50-minute headways on weekends.

Route 30. Bus route 30 provides access between the CTC and Estacada. Through the study area, it travels on 82nd Avenue and Monterey Avenue. On weekdays in the AM and PM peak period, the route is extended from The Clackamas Town Center and makes an additional final/original stop, respectively, in Downtown Portland. Route 30 offers service on weekdays and Saturdays. It operates on headways ranging between 25 and 60-minute headways on weekdays and 60-minute headways on Saturdays.

Route 33. Route 33 provides service between the CTC and Clackamas Community College via Downtown Milwaukie, and along 82nd Avenue and Monterey Avenue in the study area. The route runs all week, is a designated frequent service route, with 15-minute headways for most of the day.

Route 34. Route 34 runs from CTC Transit Center and Oregon City Transit center and travels briefly on 82nd Avenue and Monterey Avenue within the study area. Service is only available during weekdays, with headways every 30-35 minutes between 6:00 am and 6:00 pm.

Route 71. Bus route 71 provides access between CTC Transit Center and Lents and travels briefly on 82nd Avenue and Monterey Avenue within the study area. Route 71 is a regional bus route offering service on both weekdays and weekends. It operates on headways between 15 and 30-minute headways.

Route 72. Bus route 72 provides access between Swan Island and the CTC Transit Center and travels briefly on 82nd Avenue and Monterey Avenue within the study area. Route 72 is a frequent service bus and runs on seven to 30-minute headways every day of the week.

Route 79. Bus route 79 provides access between CTC Transit Center and the Oregon City Transit Center. Route 79 is a regional bus route offering service on both weekdays and weekends. It operates on 30 to 35-minute headways, entering the study area via 82nd Avenue and Monterey Avenue.

Route 152. Bus route 152 provides access between CTC Transit Center and the CTC. Route 152 only offers service on weekdays and accesses the study area via 82nd Avenue and Monterey Avenue. It operates on 30-minute headways during the AM and PM peak periods and 75-minute headways during the rest of the day.

MAX Green Line. The light rail green line provides access between the CTC Transit Center and Portland State University in Downtown Portland via the route identified in the map below. The Green Line operates on 10 to 30-minute headways daily.

3.3. Analysis Period

According to turning movement counts collected in 2016, the critical traffic period in 2016 was the evening PM peak period. The analysis assumes that the PM peak hour will be the period from 4:30-5:30 PM. The morning peak hour of 7:15-8:15 AM and the Midday peak hour of 12:00-1:00 PM were also analyzed. As stated in section 2.2.2 above, Clackamas County operational standards for the PM peak govern a two-hour peak period. An analysis of the turning movement counts collected in 2016 identify the side hour (defined as 30 minutes on each side of the peak hour) as having 95% of the volume of the peak hour in the PM. This implies that as long as the peak hour V/C ratio is less than 1.04, the side hour V/C ratio will be under the 0.99 standard for the side hour.

3.4. SimTraffic Model Calibration

Before the analysis could begin, the Synchro and SimTraffic models were calibrated for local conditions. For the calibration, traffic volumes, lane configurations, lane utilization and signal timing were input into the Synchro and SimTraffic models. The SimTraffic model was then run for the PM peak hour. The hour-long simulation was conducted with a Peak Hour Factor (PHF) to replicate the peaking traffic patterns within the peak hour. Turning speeds and headway factors in the SimTraffic model were adjusted and the PM peak hour was re-simulated and, once again, compared to the field observations. This process was repeated until the model was visually comparable to the actual field observations. Once this visual level of calibration was gained, volume throughputs were summarized from the SimTraffic simulations and compared to actual count data. Additionally, to further calibrate the model to observed field conditions, the following location specific calibration measures were used:

- At the intersection of 82nd Avenue and Sunnyside Road (#17) in the PM peak hour models:
 - The northbound and southbound left-turn pockets were extended to replicate the two-way-left-turn-lane that is present on 82nd Ave, to match observations in the field.
 - The westbound left-turn speed was increased to 20 MPH to replicate queue lengths observed in the field.
 - The westbound left-turn headway was reduced from 1.0 to 0.75 to replicate queue lengths observed in the field.
 - All other movement headways were reduced from 1.0 to 0.90 to replicate queue lengths observed in the field.
- At the intersection of Sunnybrook Boulevard and the Northbound I-205 Ramp Terminal (#25):
 - The northbound right-turn speed was increased to 20 MPH to replicate field observations.

- At the intersection of Sunnyside Road and Stevens Road (#21) in the midday and PM peak hours:
 - The southbound left-turn speed was increased to 20 mph to replicate field observations.
 - The southbound left-turn and through saturation flow rates were increased to 2,100 vehicles per hour to replicate queue lengths observed in the field.
 - The eastbound left-turn saturation flow rate was increased to 2000 vehicles per hour to replicate queue lengths observed in the field.
- At the intersection of Stevens Road and the Shopping Center Entrance (#16):
 - The southbound through movement saturation flow rate was increased to 2,000 vehicles per hour to replicate queue lengths observed in the field.

Given the limited field data used for this (and most) traffic analysis, the manufacturers of SimTraffic consider calibration to within 20% of actual counts a realistic goal. A 10% calibration is considered excellent but generally requires more detailed field data such as acceleration rates, reaction times, headways, and free flow speeds. ODOT's Transportation Planning and Analysis Unit (TPAU) has collected field data and suggested edits to some of these default simulation parameters. The suggested TPAU edits have been included in this analysis. Finally, seven SimTraffic simulation seeds were run and the highest and lowest total delay seeds were omitted. The remaining five runs were averaged to obtain an average model run.

With respect to volume served, if a movement demand was less than 50 vehicles it was assumed to be calibrated if the served volume was within five vehicles of the actual count. If a movement demand was over 50 vehicles, the 10 or 20% goal was calculated. In the AM peak hour, 99% of the movements present were within the 10% goal and 100% of the movements were within the 20% goal. In the Midday peak hour, 96% of the movements present were within the 10% goal and 100% of the movements were within the 20% goal. In the PM peak hour, 99% of the movements present were within the 10% goal and 100% of the movements were within the 20% goal. The input demands and volume served are reported in Appendix A.

3.5. 2016 Existing Traffic Conditions

This section summarizes the traffic conditions within the study area for the year of 2016.

3.5.1. 2016 Traffic Volumes

New intersection turning movement counts were collected for 25 study area intersections in May and June 2016. To meet the applicable City, County, and State standards, counts were conducted during the AM, midday, and PM peak hours. **Table 3** summarizes the dates of the data collection for each count period.

Table 3. Traffic Count Collection Dates (2016)

Intersection	Count Period		
	AM	Midday	PM
1. Johnson Cr Blvd at I-205 SB	5/4/2016		5/4/2016
2. Johnson Cr Blvd at I-205 NB	5/4/2016		5/4/2016
3. Johnson Cr Blvd at 92nd Ave		5/4/2016	5/4/2016
4. Otty Rd/Idleman Rd at Bob Schumacher Rd/92nd Ave		5/4/2016	5/4/2016
5. Idleman Rd at 92nd Ave		5/4/2016	5/4/2016
6. Hillcrest Rd at Stevens Rd		5/4/2016	5/4/2016
7. Bob Schumacher Rd at Causey		6/15/2016	6/16/2016
8. Causey Ave at Bob Schumacher Rd	6/15/2016		6/16/2016
9. William Otty Rd at Monterey Ave	6/16/2016		6/16/2016
10. William Otty Rd at Valley View Terr	6/16/2016		6/16/2016
11. Monterey Ave at 82nd Ave	6/14/2016	6/14/2016	6/14/2016
12. Monterey Ave at Bob Schumacher Rd		6/15/2016	6/15/2016
13. Monterey Ave at Stevens Rd	6/15/2016		6/15/2016
14. Apartment Driveway at Stevens Rd	6/15/2016		6/15/2016
15. Bob Schumacher Rd at Stevens Rd		6/14/2016	6/14/2016
16. Shopping Center at Stevens Rd		6/14/2016	6/14/2016
17. Sunnyside Rd at 82nd Ave	6/14/2016	6/14/2016	6/14/2016
18. Sunnyside Rd at 93rd Ave		6/15/2016	6/15/2016
19. Sunnyside Rd at I-205 SB	6/14/2016	6/14/2016	6/14/2016
20. Sunnyside Rd at I-205 NB	6/14/2016	6/14/2016	6/14/2016
21. Sunnyside Rd at Stevens Rd		6/14/2016	6/14/2016
22. Sunnyside Rd at Valley View Terr		6/14/2016	6/14/2016
23. Sunnybrook Blvd at 82nd Ave	6/15/2016		6/15/2016
24. Sunnybrook Blvd at I-205 SB	6/15/2016	6/15/2016	6/15/2016
25. Sunnybrook Blvd at I-205 NB	6/15/2016	6/15/2016	6/15/2016

Note: Cells shaded in grey indicate traffic counts were not needed for this time period

Figure 2 depicts the 2016 existing AM turning movement volumes, **Figure 3** depicts the 2016 existing Midday turning movement volumes and **Figure 4** depicts the 2016 existing PM turning movement volumes. The raw intersection counts are found in Appendix B.

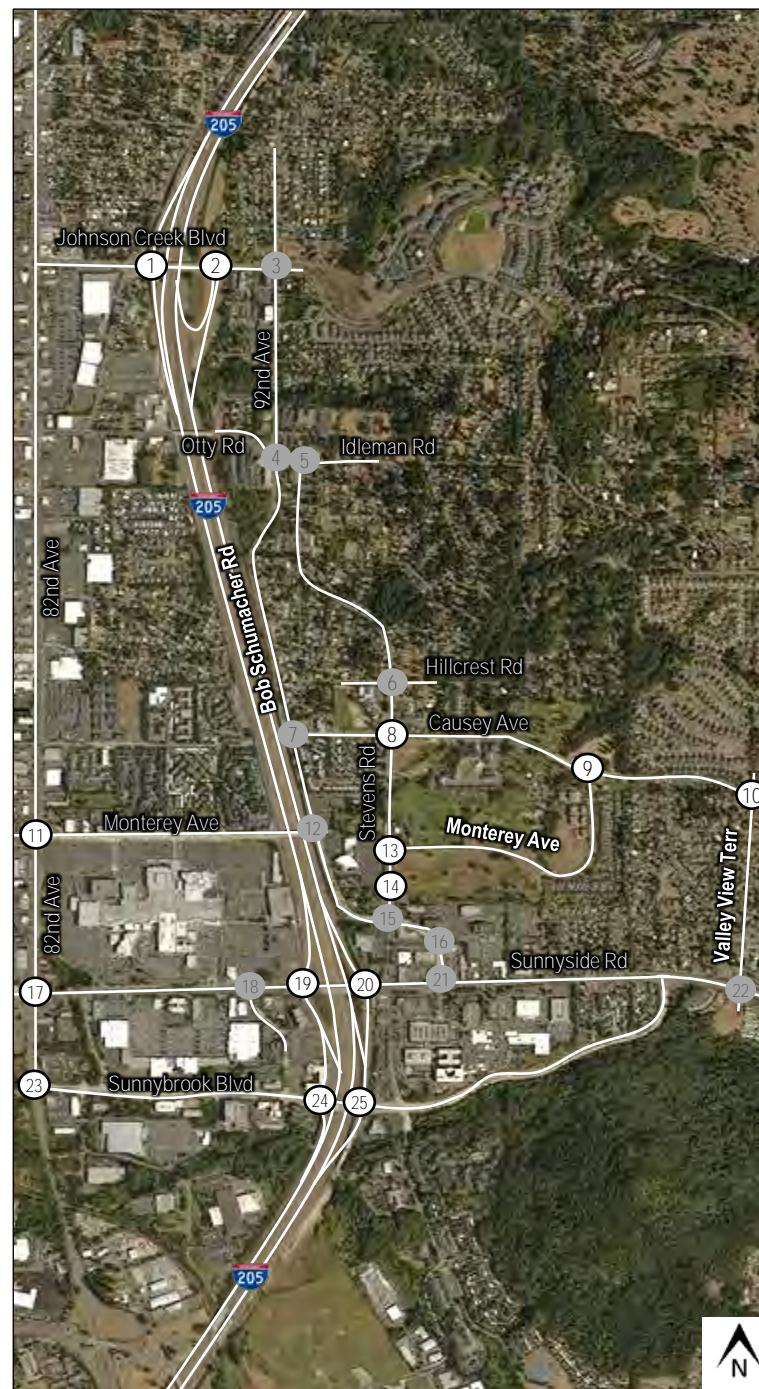
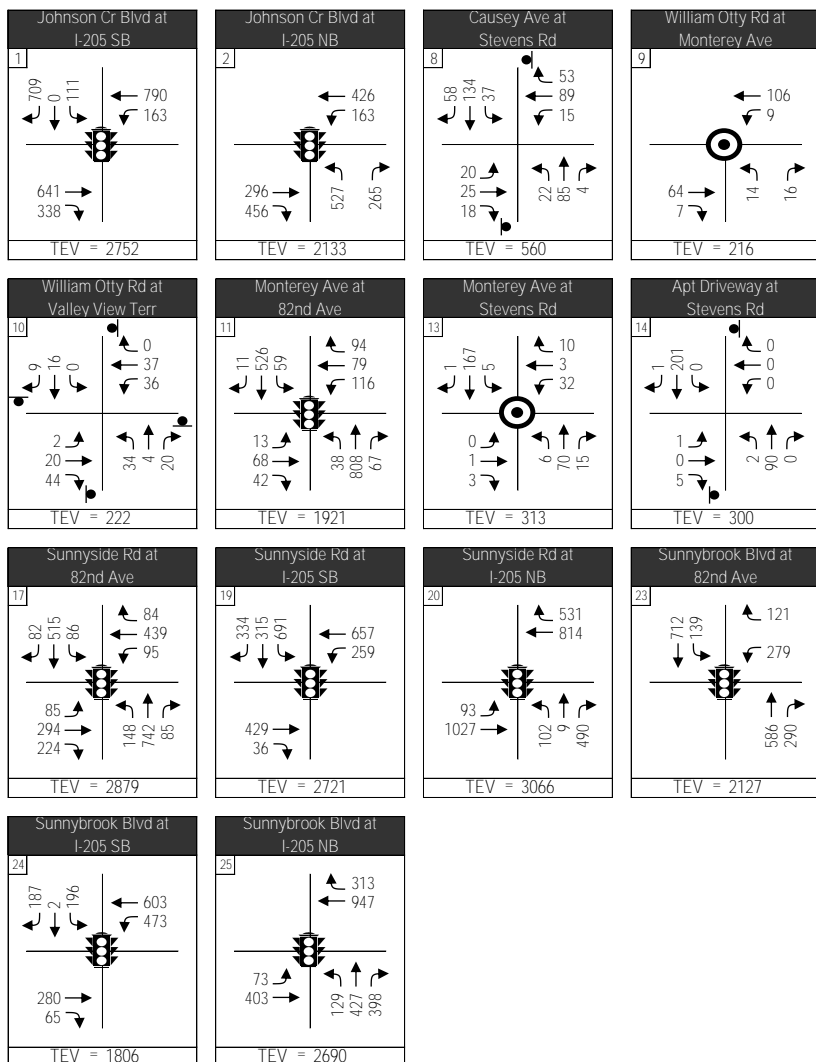


Figure 2

Existing (2016)
AM Peak Hour
Turning Movement
Volumes

Legend

- ➔ Turning Movement
- ## Peak Hour Volume
- TEV: Total Entering Volume
- STOP Control
- Signalized Intersection
- Roundabout
- ① Intersection Number
- Intersection not analyzed during this time period

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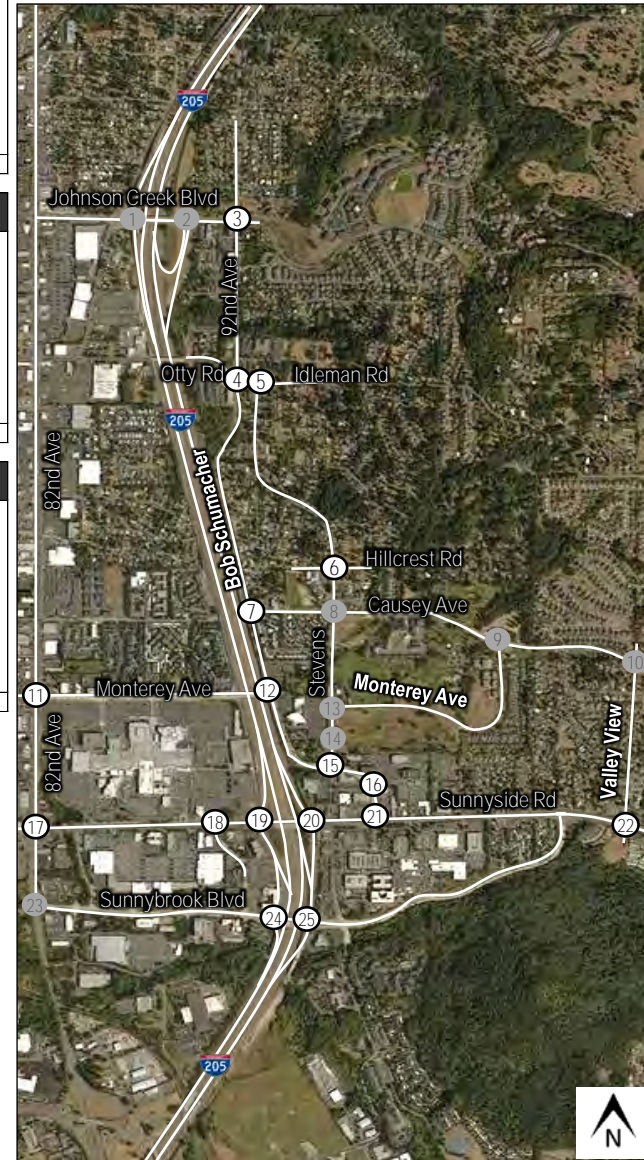
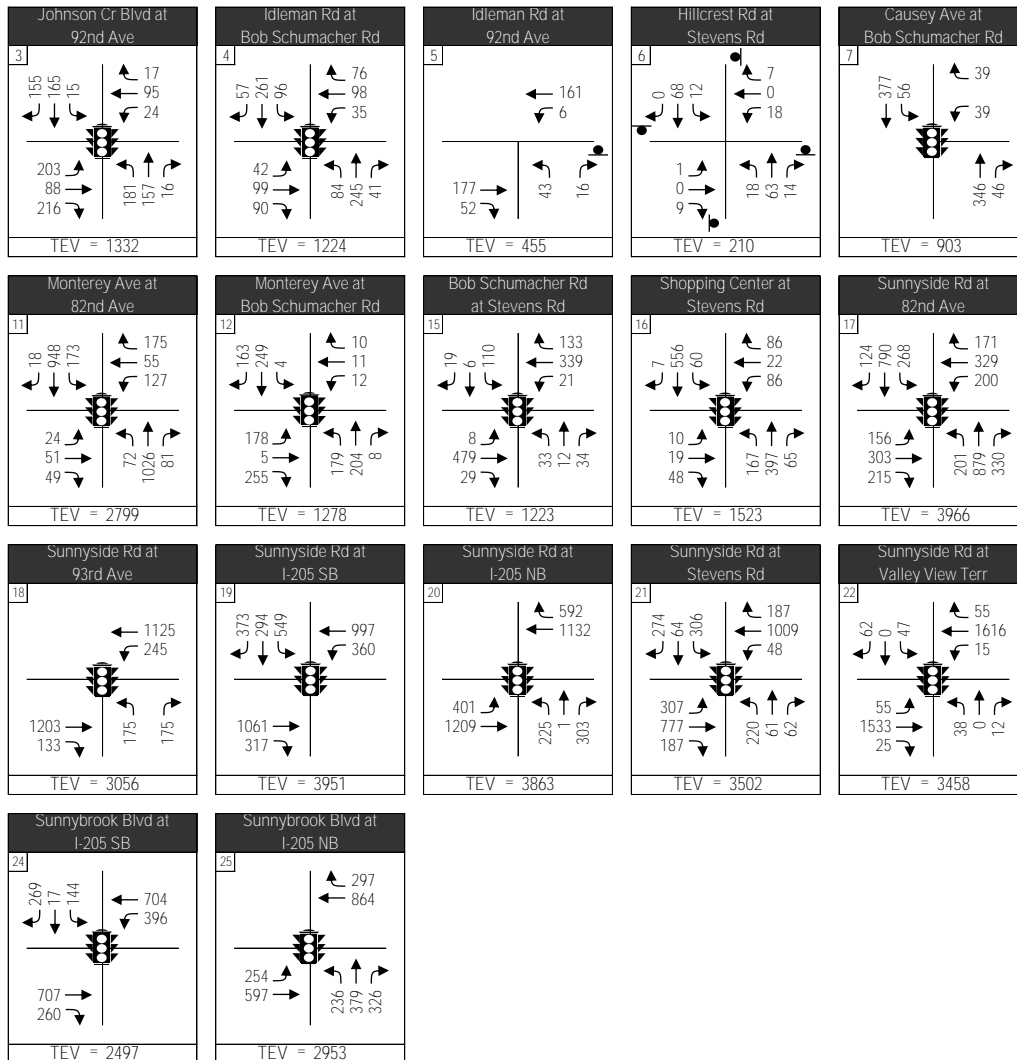
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Figure 3

Existing (2016)
Midday Peak Hour
Turning Movement
Volumes

Legend

- ↔ Turning Movement
- ## Peak Hour Volume
- TEV: Total Entering Volume
- STOP Control
- Signalized Intersection
- Roundabout
- ① Intersection Number
- Intersection not analyzed during this time period



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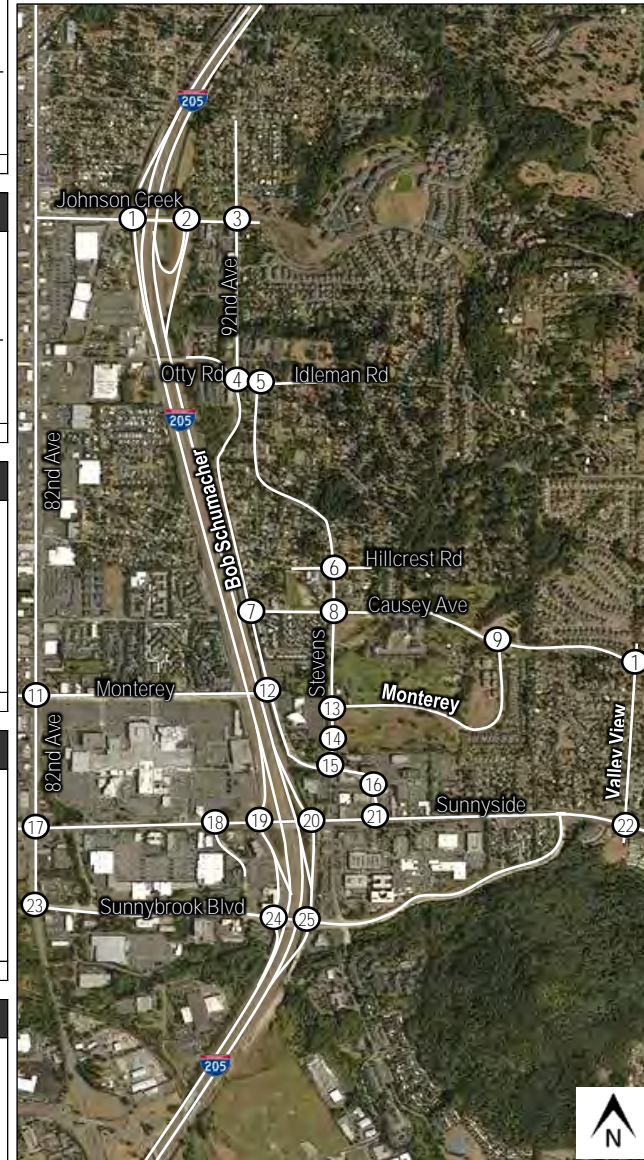
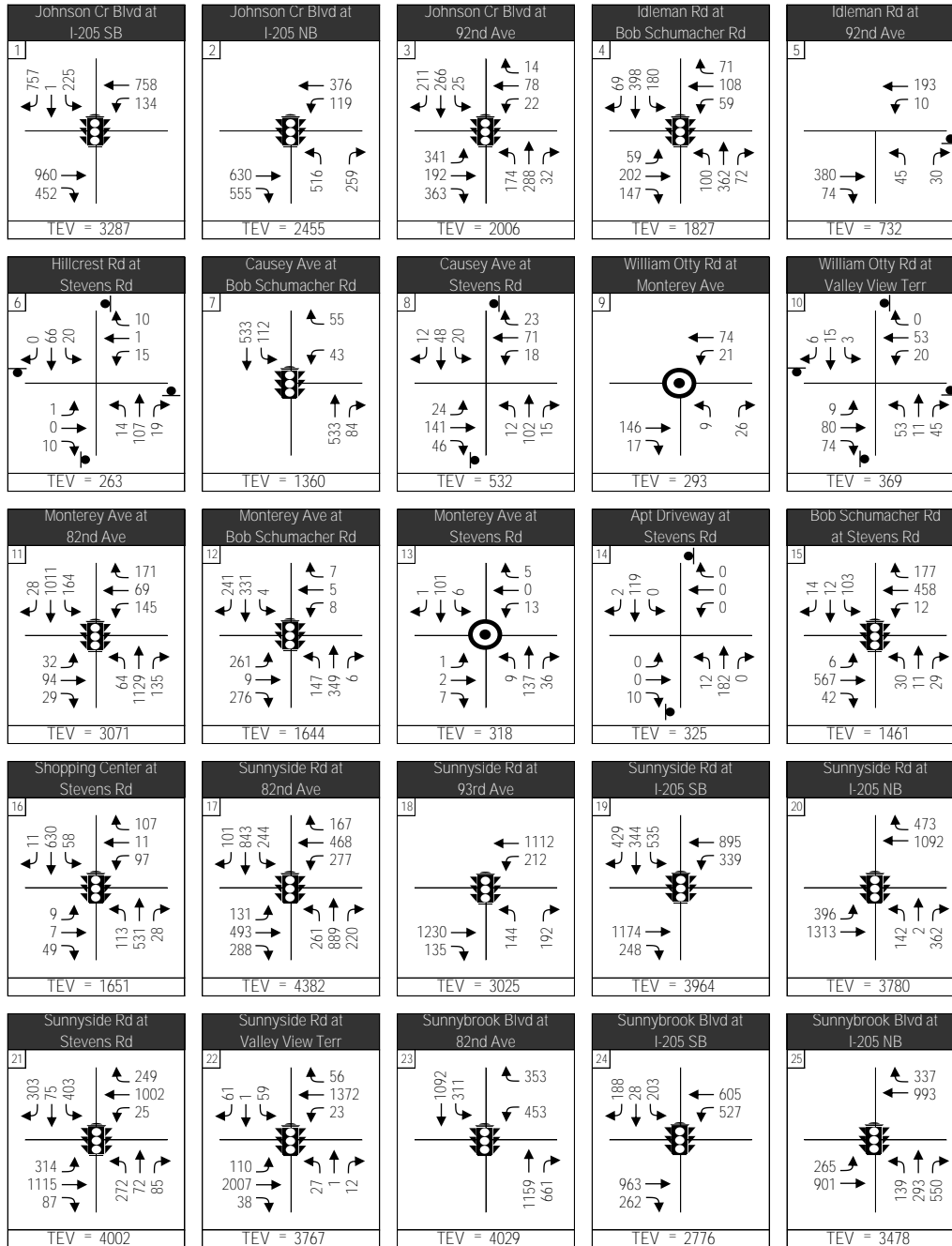
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Development

Figure 4

Existing (2016)
PM Peak Hour
Turning Movement
Volumes

Legend

- ➔ Turning Movement
- ## Peak Hour Volume
- TEV: Total Entering Volume
- STOP Control
- Signalized Intersection
- Roundabout
- ① Intersection Number



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3.5.2. 2016 Intersection Operations

Table 4 depicts the intersection operational results for the year 2016. The full Synchro/SimTraffic outputs are contained in Appendix C. Under existing conditions, all of the study area intersections meet the applicable operational performance standards during the AM, Midday or PM peak hour. The operational standards are summarized in Section 2.1.4 (Summary of Study Area Performance Standards) and listed in **Table 1** (page 4).

Table 4. 2016 Existing Intersection Operations

Intersection			Operations		
			AM	MD	PM
1	Johnson Cr Blvd at I-205 SB Signalized	V/C	0.85		0.87 ¹
		LOS	C		C
2	Johnson Cr Blvd at I-205 NB Signalized	V/C	0.51		0.54
		LOS	B		B
3	Johnson Cr Blvd at 92nd Ave Signalized	V/C		0.45	0.67
		LOS		C	C
4	Otty Rd/Idleman Rd at Bob Schumacher Rd/92nd Ave Signalized	V/C		0.51	0.62
		LOS		C	C
5	Idleman Rd at 92nd Ave Unsignalized (NB stop controlled)	V/C		0.09	0.15
		LOS		B	B
6	Hillcrest Rd at Stevens Rd Unsignalized (all-way stop controlled)	V/C		0.11	0.18
		LOS		A	A
7	Causey Ave at Bob Schumacher Rd Signalized	V/C		0.33	0.51
		LOS		A	A
8	Causey Ave at Stevens Rd Unsignalized (EB/WB stop controlled)	V/C	0.14/0.45		0.28/0.14
		LOS	C/C		B/B
9	William Otty Rd at Monterey Ave Roundabout (NB/EB/WB)	V/C	0.15		0.17
		LOS	overall: A, each approach: A/A/A		overall: A, each approach: A/A/A
10	William Otty Rd at Valley View Terr Unsignalized (all-way stop controlled)	V/C	0.09		0.25
		LOS	A		A
11	Monterey Ave at 82nd Ave Signalized	V/C	0.47	0.59	0.66
		LOS	B	C	C
12	Monterey Ave at Bob Schumacher Rd Signalized	V/C		0.42	0.53
		LOS		C	B
13	Monterey Ave at Stevens Rd Roundabout (NB/SB/EB/WB)	V/C	0.23		0.19
		LOS	overall: A, each approach: A/A/A/A		overall: A, each approach: A/A/A/A
14	Apt Driveway at Stevens Rd Unsignalized EB stop controlled	V/C	0.01		0.01
		LOS	A		A
15	Bob Schumacher Rd at Stevens Rd Signalized	V/C		0.38	0.39
		LOS		B	A
16	Shopping Center at Stevens Rd Signalized	V/C		0.44	0.41
		LOS		B	B
17	Sunnyside Rd at 82nd Ave Signalized	V/C	0.62	0.71	0.84
		LOS	C	D	D
18	Sunnyside Rd at 93rd Ave Signalized	V/C		0.44	0.42
		LOS		B	B
19	Sunnyside Rd at I-205 SB Signalized	V/C	0.62	0.71	0.69
		LOS	C	C	C
20	Sunnyside Rd at I-205 NB Signalized (metered on-ramp)	V/C	0.67	0.72	0.78
		LOS	C	B	C
21	Sunnyside Rd at Stevens Rd	V/C		0.77	0.75

Table 4. 2016 Existing Intersection Operations

Intersection			Operations		
			AM	MD	PM
	Signalized	LOS		C	D
22	Sunnyside Rd at Valley View Terr	V/C		0.54	0.58
	Signalized	LOS		A	B
23	Sunnybrook Blvd at 82nd Ave	V/C	0.46		0.73
	Signalized	LOS	B		C
24	Sunnybrook Blvd at I-205 SB	V/C	0.39	0.37	0.50
	Signalized (metered on-ramp)	LOS	C	B	C
25	Sunnybrook Blvd at I-205 NB	V/C	0.41	0.43	0.67
	Signalized	LOS	B	B	C

Notes: Cells shaded in grey indicate traffic analysis was not required for this time period

1. ODOT Ramp terminals may reference a 0.90 v/c or below if queuing is shown to not affect the safe deceleration area.

3.5.3. 2016 Intersection Queuing

This section describes the presence and extent of queuing within the study area. When a movement at an intersection is operating near or above capacity, a queue starts to form. Depending on intersection operations, these queues can grow long enough to spill out from turn lanes and begin to affect through lanes. If an entire approach is over capacity, the resulting queuing can affect the entire roadway segment.

Table C1 in Appendix C summarizes queue lengths within the study area and the available queuing storage for supplemental turn lanes. These queue lengths are summarized to give a reference point from which to compare future queue lengths. The turn movements observed exceeding their available storage are shown in **Table 5** below. For the most part, excessive queuing is isolated and queues do not effect adjacent intersections. The exception is along Sunnyside Road. It is for this reason that Clackamas County is working on deploying adaptive signal timing along the Sunnyside corridor between 93rd Avenue and Sunnybrook Boulevard.

Table 5. 2016 Existing 95th Percentile Queue Lengths by Movement

Intersection		Movement	Queue Length (ft)			Available Storage (ft)
			AM	Midday	PM	
1	Johnson Cr Blvd at I-205 SB Signalized (Ramp Terminal)	WBL	225		225	175
2	Johnson Cr Blvd at I-205 NB Signalized (Ramp Terminal)	WBL	175		-	175
3	Johnson Cr Blvd at 92nd Ave Signalized	EBL		175	250	175
		NBL		175	-	175
11	Monterey Ave at 82nd Ave Signalized	NBL	-	150	150	125
		NBR	150	-	125	125
12	Bob Schumacher & Monterey Ave Signalized	SBTR		-	150	150
16	Shopping Center at Stevens Rd Signalized	SBL		200	-	200

Table 5. 2016 Existing 95th Percentile Queue Lengths by Movement

Intersection		Movement	Queue Length (ft)			Available Storage (ft)
			AM	Midday	PM	
17	Sunnyside Rd at 82nd Ave Signalized	EBL	-	225	250	175
		EBR	-	300	350	225
		WBL	-	350	350	250
		NBL	-	450	450	350
		NBR	125	250	250	115
		SBL	-	400	400	320
		SBR	-	200	200	125
18	93rd Ave & Sunnyside Rd Signalized	WBL		200	-	200
19	Sunnyside Rd at I-205 SB Signalized	WBL	275	275	325	175
20	Sunnyside Rd at I-205 NB Signalized (metered on-ramp)	EBL	-	225	225	200
21	Sunnyside Rd at Stevens Rd Signalized	EBL		425	350	350
		EBL		450	375	350
		WBL		175	-	175
		WBTR		350	350	260
		SBL		325	325	220
22	Sunnyside Rd at Valley View Terr Signalized	NBL		50	50	50
23	Sunnybrook Blvd at 82nd Ave Signalized	WBL	-		300	240
		SBL	-		400	350
24	Sunnybrook Blvd at I-205 SB Signalized (metered on-ramp)	EBT	-	-	275	250
		WBL	-	175	175	130
25	Sunnybrook Blvd at I-205 NB Signalized	EBL	-	-	200	175
		NBR	-	-	425	400

3.6. Safety Summary

A safety analysis was conducted to determine if there are any significant documented safety issues or trends at the study intersections. The safety analysis included a review of crash history obtained from ODOT's online GIS database, which displays crash records from ODOT's Crash Analysis and Reporting Unit in a mapping platform. The data summarized in this analysis is for the three most recent full years of crash data available at the time of the analysis (January 1, 2012 through December 31, 2014). Data from 2015 is still preliminary and was not considered for this analysis (as of 3/8/2017). Crash information through ODOT is collected from police reports (local/county/state), and required crash reports from drivers who have been in accidents. These reports are compiled by ODOT staff into a computer database by day/month/calendar year and by location. It should also be noted that this analysis only accounts for those crashes that were reported. In Oregon, legally reportable crashes are those involving death, bodily injury or damage to any one person's property in excess of \$1,500.

The detailed crash reports can be found in Appendix D.

3.6.1. Calculation of Crash Rates

The crash rates were calculated from ODOT-provided crash data. For a crash to be considered associated with an intersection, it must occur within 0.05 miles (265 feet) of the intersection. Beyond this distance, crash data would be placed in the segment category. However, no study area roadways are longer than 1 mile without an intersection; therefore, there are no segments to analyze.

Intersection crash rates were calculated using the following equations:

$$rate_{int} = \frac{(Crashes \cdot 1,000,000)}{(365 \cdot Years \cdot ADT)}, \text{ where}$$

Rate_{int} = Crash rate per Million Entering Vehicles (MEV)

Crashes = Number of crashes during the time segment

Years = Number of years being studied

ADT = Average Daily Traffic volume entering the intersection

The number of crashes was determined from ODOT crash data. The sum of the total PM peak hour entering volumes, from each leg, was multiplied by ten in order to estimate an intersection ADT. Crash rates were then calculated for the entire three-year study period.

3.6.2. Intersection Crash Rates

The crash analysis included a review of crash history data supplied by the ODOT Crash Analysis and Reporting Unit for the period between January 1, 2012, and December 31, 2014, which were the three most recent full years for which crash data were available and complete at the time of the analysis. At the time this report was written, the 2015 data was preliminary and subject to change; fatal and injury rates will be skewed until the data is finalized.

Crash history within the project area was screened to identify crashes at or near the 25 study intersections based on location (within 265 ft of the intersection). The crash history summarized by intersection is shown in **Table 6**. Each location has a breakdown of collision type and severity. Between 2012 and 2014, there were 493 crashes in the study area. Five of these crashes resulted in serious injuries and 264 resulted in minor injury. The rest resulted in property damage only. No fatalities were recorded at intersections during the analysis period. Of the reported crashes, over half (54 percent) were rear-end collisions, 23 percent were turning movement, and 10 percent were angle collisions. These collisions types are typical for high-volume intersections such as those included in the study area.

Intersection crash rates were calculated for each location, which represent the number of crashes at an intersection per million entering vehicles (MEV). The crash rates were compared to the published statewide 90th percentile intersection crash rates. Ten intersections exceeded the statewide 90th percentile rate. In general, these intersections experience a high volume of daily traffic and a large number of rear-end, turning movement, and angle collisions, which are the most common types of collisions observed in the study area.

At Johnson Creek Boulevard and the Southbound I-205 Ramp Terminal, nearly 40 percent of crashes occurred on the southbound ramp from I-205, with the rest involving vehicles traveling east-west on Johnson Creek Boulevard. The build alternative proposes to fix some of the geometric issues related to the channelized southbound right-turns, which may affect the frequency of rear-end collisions in this direction. At the intersection of Monterey Avenue and 82nd Avenue, the majority of collisions reported occurred in the north-south direction. Construction of the west leg of this intersection was recently completed and may have influenced recent crash history at this location. The crash rate at Sunnyside Road and the Southbound I-205 Ramp Terminal was calculated without the volume of southbound right-turns to the CTC. The volume of this movement, if included, would likely reduce the crash rate at this location, especially considering over 60 percent of crashes at this intersection occurred between vehicles on the southbound ramp from I-205. Lastly, the intersection of Sunnybrook Boulevard and the Northbound I-205 Ramp Terminal experiences a relatively large number of angle crashes (23). Many of the crashes at this intersection involved vehicles in the east-west direction, some of which were attributed to drivers entering the intersection after the traffic signal turned red.

Table 6. Summary of Collision Types (January 1, 2012 through December 31, 2014)

Study Intersection		Collision Type									Total Crashes by Location	Severity			Crash Rate	Statewide 90 th Percentile Rate
		Angle	Backing	Bike/Pedestrian	Fixed Object	Rear-End	Sideswipe - Meeting	Sideswipe - Overtaking	Turning Movement	Other		Serious Injury* Crashes	Injury Crashes	Property Damage Only Crashes		
1	Johnson Cr Blvd at SB I-205 Ramps	0	0	0	2	49	0	2	3	0	56	1	31	24	1.56	0.860
2	Johnson Cr Blvd at NB I-205 Ramps	0	0	0	3	15	0	0	0	1	19	0	11	8	0.71	0.509
3	Johnson Cr Blvd at 92nd Ave	2	1	0	0	8	0	0	1	0	12	0	8	4	0.55	0.860
4	Otty Rd at Bob Schumacher Rd	0	1	0	0	7	0	0	4	0	12	1	5	6	0.60	0.860
5	Idleman Rd at 92nd Ave	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.293
6	Hillcrest Rd at Stevens Rd	0	0	0	0	1	0	0	0	0	1	0	0	1	0.35	0.408
7	Causey Ave at Bob Schumacher Rd	0	0	0	0	1	1	0	2	0	4	0	3	1	0.27	0.860
8	Causey Ave at Stevens Rd	5	0	0	0	0	0	0	0	0	5	0	3	2	0.86	0.509
9	Causey Ave at Monterey Ave	0	0	0	0	0	0	0	1	0	1	0	0	1	0.31	0.293
10	William Otty Rd at Valley View Terrace	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.408
11	Monterey Ave at 82nd Ave	2	0	1	0	20	0	3	16	1	43	0	31	12	1.28	0.860
12	Monterey Ave at Bob Schumacher Rd	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.860
13	Monterey Ave at Stevens Rd	0	0	0	0	1	0	1	0	0	2	0	1	1	0.57	0.408
14	Apartment Driveway at Stevens Rd	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.293
15	Bob Schumacher Rd at Stevens Rd	1	0	0	2	0	0	0	1	0	4	1	2	1	0.25	0.860
16	Shopping Center at Stevens Rd	0	0	0	0	1	1	0	1	0	3	0	1	2	0.17	0.860
17	Harmony/Sunnyside Rd at 82nd Ave	2	2	2	0	24	0	7	10	0	47	0	23	24	0.98	0.860
18	Sunnyside Rd at 93rd Ave	0	0	0	0	7	0	1	22	0	30	0	17	13	0.91	0.509
19	Sunnyside Rd at SB I-205 Ramps	5	1	1	5	44	0	3	15	0	74	0	45	29	1.70**	0.860
20	Sunnyside Rd at NB I-205 Ramps	2	0	1	1	29	0	3	5	0	41	0	16	25	0.99	0.860
21	Sunnyside Rd at Stevens Rd	1	1	0	0	26	0	8	7	0	43	1	20	22	0.98	0.860
22	Sunnyside Rd at Valley View Terrace	0	0	1	1	2	0	0	4	0	8	0	5	3	0.19	0.860
23	Sunnybrook Blvd at 82nd Ave	0	0	0	0	19	0	3	2	0	24	0	11	13	0.54	0.860
24	Sunnybrook Blvd at SB I-205 Ramps	6	0	0	1	3	0	1	7	0	18	1	5	12	0.59	0.860
25	Sunnybrook Blvd at NB I-205 Ramps	23	0	0	0	11	0	2	10	0	46	0	26	20	1.21	0.860
Totals		49	6	6	15	268	2	34	111	2	493	5	264	224		
% Crashes by Type		10%	1%	1%	3%	54%	0.5%	7%	23%	0.5%		1%	54%	45%		

Source: ODOT GIS Crash Data, Crash Analysis and Reporting Unit, January 1, 2012 through December 31, 2014.

*No fatalities reported during the analysis period

**Southbound right-turn volume into the Clackamas Town Center was not considered in this calculation, which may affect the crash rate at this location.

4. Future (2021) Background Traffic Analysis

4.1. 2021 Roadway Facilities

Within the study area, only one intersection improvement was assumed under the Future (2021) Background Traffic Analysis: Sunnyside Road at Stevens Road intersection capacity improvement. This improvement is a standalone Clackamas County urban renewal project and is assumed for all year 2021 scenarios. This improvement would convert the existing westbound shared through/right-turn lane to an exclusive right-turn lane. It would also convert one of the two southbound exiting lanes (from the intersection to the Kaiser hospital) into a northbound left-turn lane. This improvement, along with signal timing modifications, is expected to increase the overall capacity of the intersection. For all roadway characteristics please refer back to **Table 2** (Page 8). This analysis will be referred to as the 2021 Background condition.

4.2. Future (2021) Background Traffic Conditions

This section depicts the traffic conditions within the study area for year 2021 if the currently proposed Eagle Landing development was not built.

4.2.1. *Future (2021) Background Traffic Volumes*

Traffic volumes in recent years have increased significantly because of the rebound from the economic downturn. Because of this, historical growth trends from the previous 5 years are not thought to accurately reflect future growth trends. To calculate the 2021 Background volumes, a growth rate of 2% per year was applied to the existing (2016) AM, midday and PM traffic volumes.

Figure 5, Figure 6 and Figure 7 depict the 2021 Background AM, Midday and PM turning movement volumes, respectively. Further details summarizing the development of the 2021 Background traffic volumes are found in Appendix E.

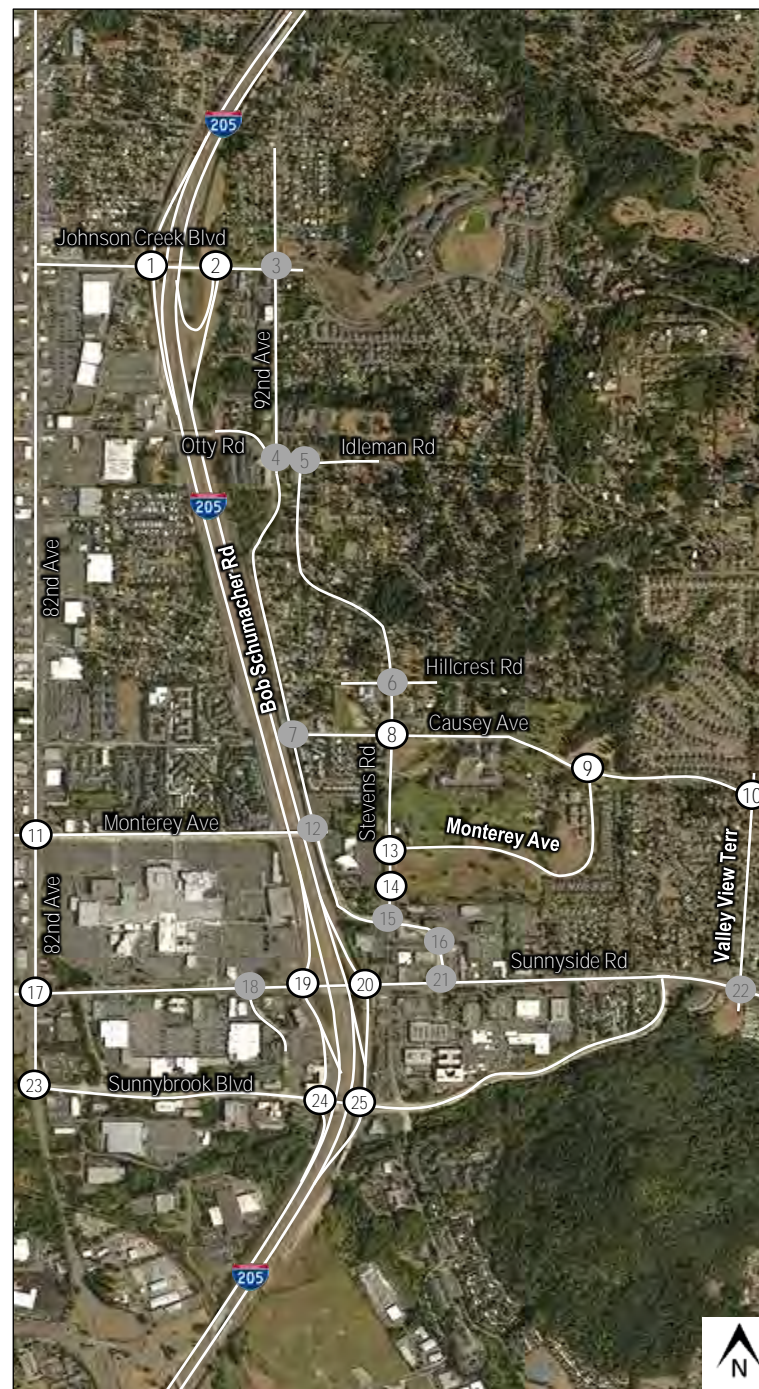
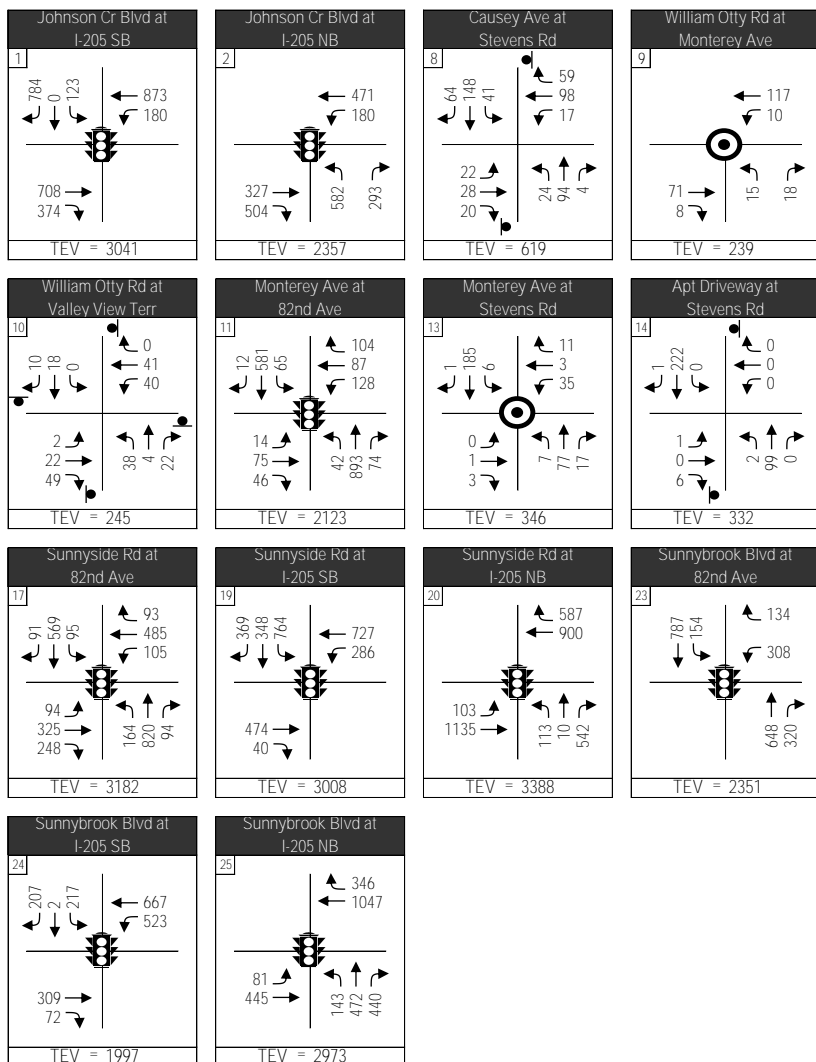


Figure 5

Future (2021)
Background
AM Peak Hour
Turning Movement
Volumes

Legend

- Turning Movement
- ## Peak Hour Volume
- TEV: Total Entering Volume
- STOP Control
- Signalized Intersection
- Roundabout
- ① Intersection Number
- Intersection not analyzed during this time period

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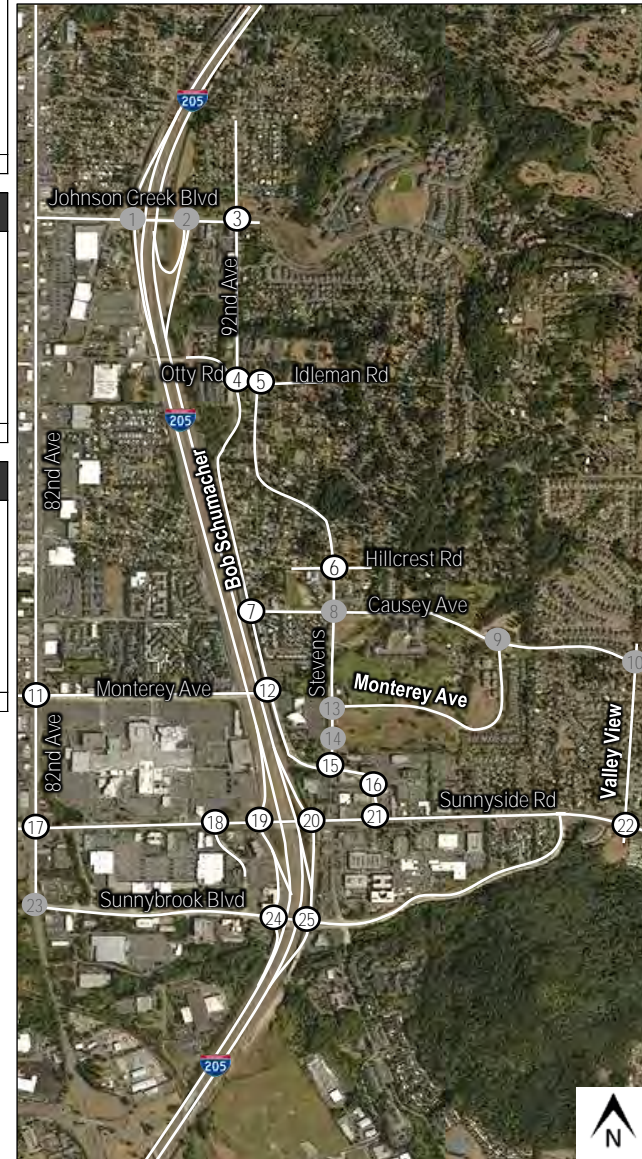
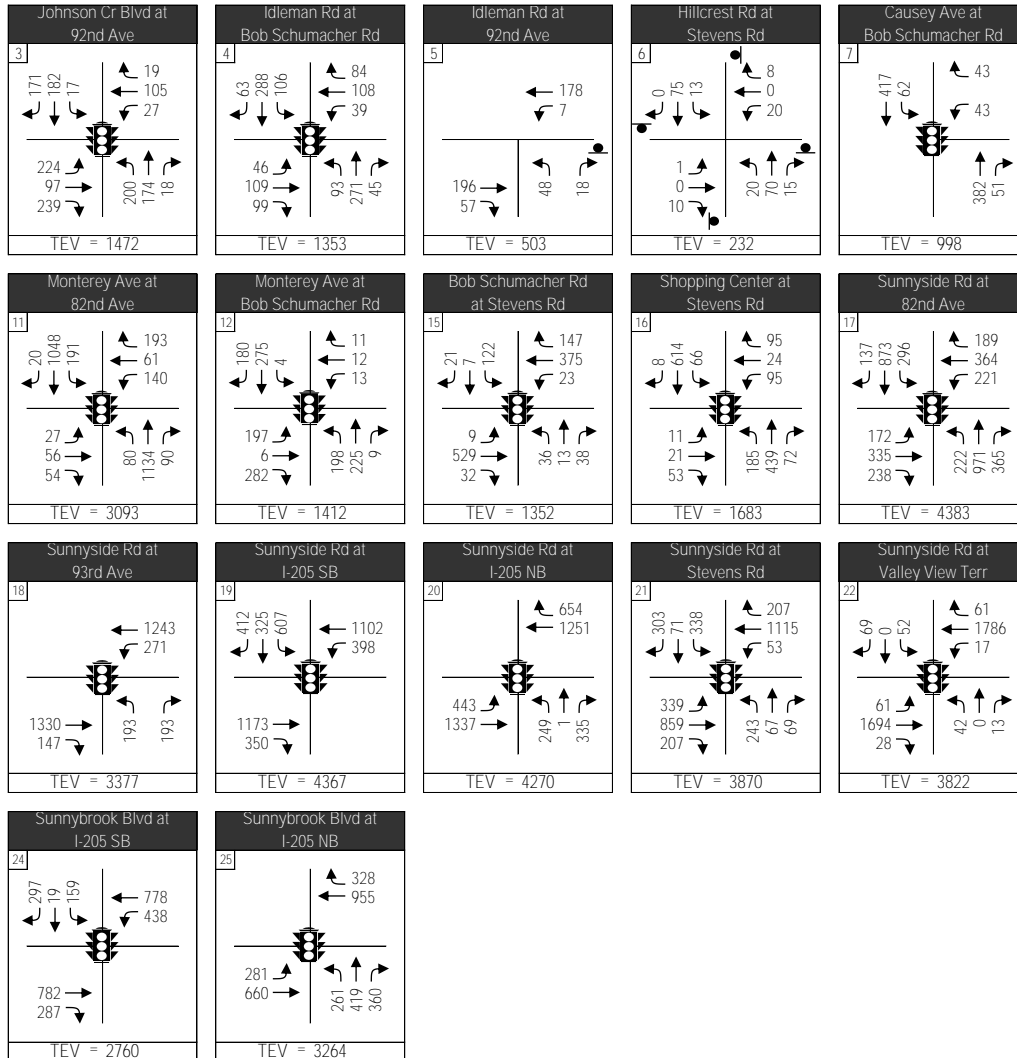


Figure 6

Future (2021)
Background
Midday Peak Hour
Turning Movement
Volumes

Legend

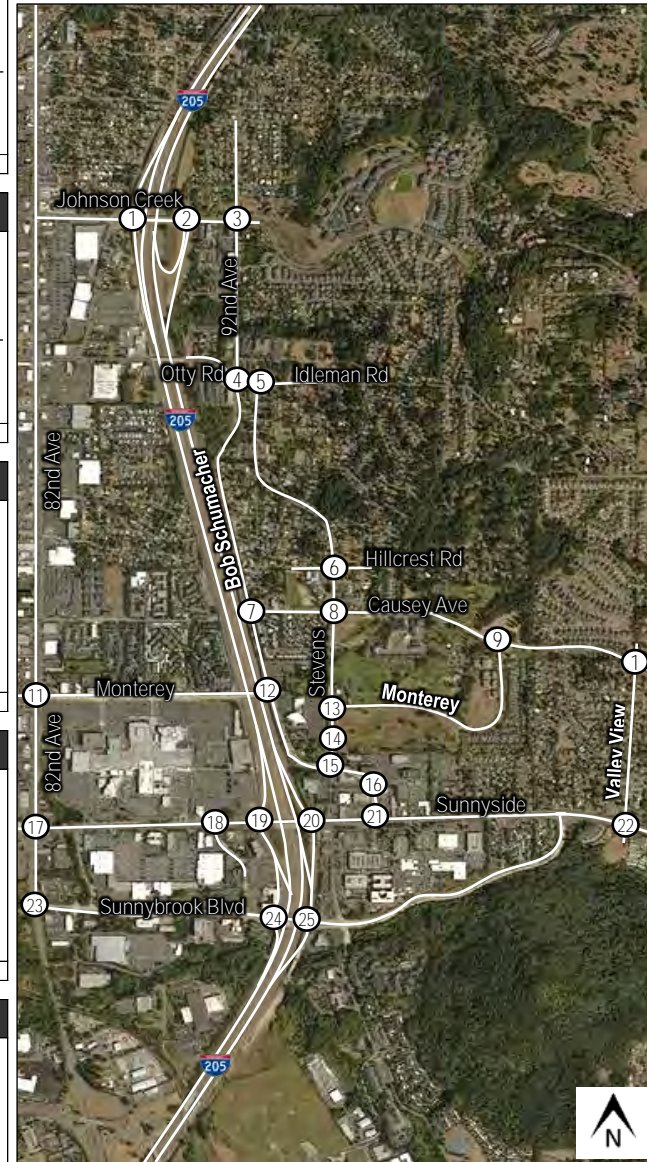
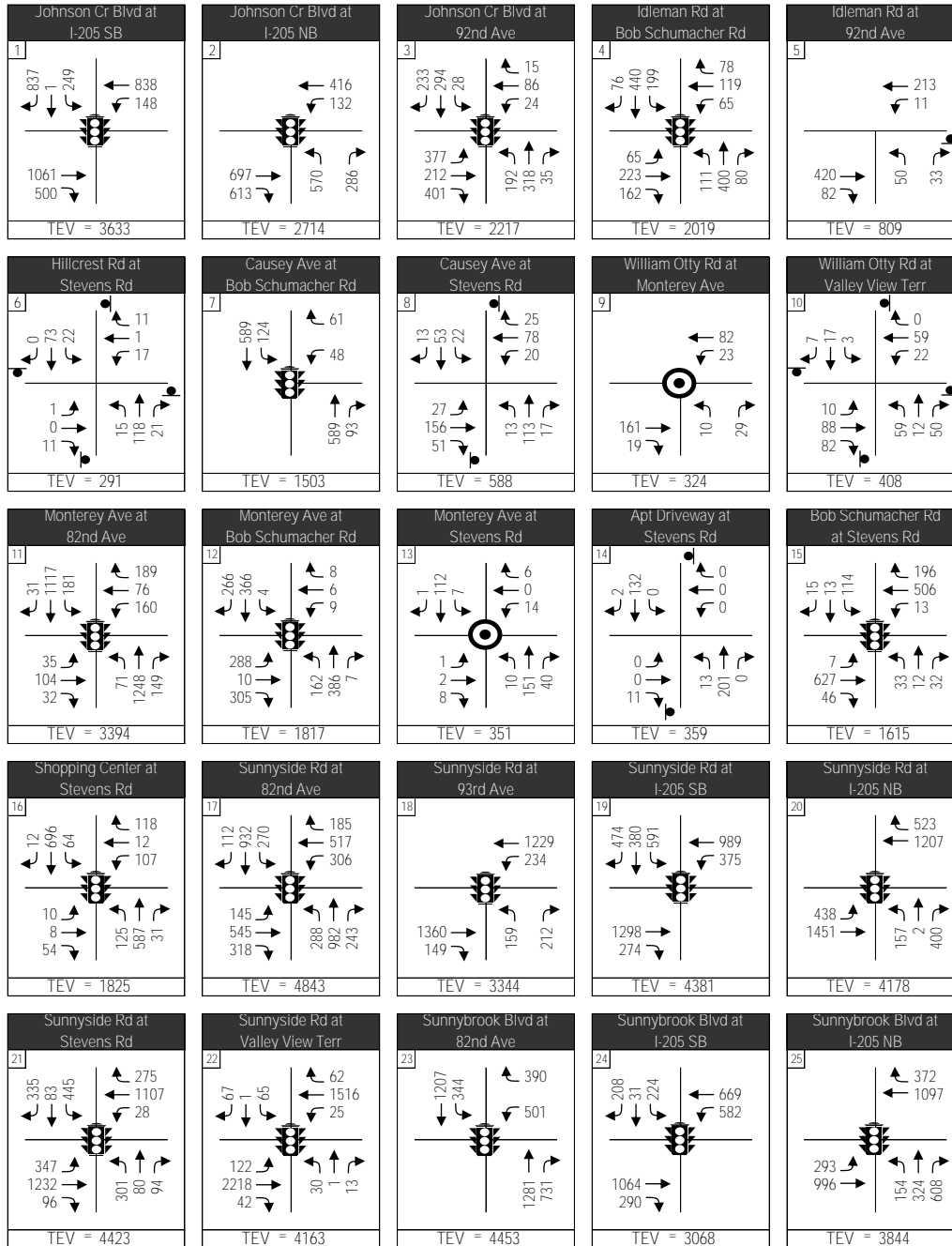
- Turning Movement
- ##** Peak Hour Volume
- TEV: Total Entering Volume
- STOP Control
- Signalized Intersection
- Roundabout
- ①** Intersection Number
- Intersection not analyzed during this time period

Figure 7

**Future (2021)
Background PM Peak
Hour Turning
Movement Volumes**

Legend

- ➔ Turning Movement
- ## Peak Hour Volume
- TEV: Total Entering Volume
- STOP Control
- Signalized Intersection
- Roundabout
- ① Intersection Number



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4.2.2. Future (2021) Background Traffic Operations

Table 7 depicts the intersection operational results for the year 2021 if the currently proposed Eagle Landing development was not built. The full Synchro/SimTraffic outputs are contained in Appendix F.

Under 2021 Background conditions, all of the study area intersections meet the applicable operational performance standards during the AM, midday or PM peak hour, with the exception of Johnson Creek Boulevard at the I-205 southbound ramp terminal. This intersection operates at a V/C of 0.94, which exceeds the performance standard of 0.90. It should be noted that normally the standard is a V/C of 0.85; however, 0.90 is acceptable if queuing is not expected to create safety concerns.

It is understood that the City of Happy Valley intends to convert the intersection of Stevens Road at Causey Avenue to an all-way stop controlled intersection. As such, all of the future (2021) analyses in this TIS assume that the intersection of Stevens Road at Causey Avenue will operate as an all-way stop controlled intersection. Under all scenarios, there are no approaches that exceed LOS C. As the City standard is an overall LOS of D or better, it is expected that this intersection would operate within City standards as an all-way stop controlled intersection.

Table 7. Future (2021) Background Intersection Operations

Intersection			Operations		
			AM	MD	PM
1	Johnson Cr Blvd at I-205 SB Signalized	V/C	0.94		0.94
		LOS	C		C
2	Johnson Cr Blvd at I-205 NB Signalized	V/C	0.55		0.58
		LOS	B		B
3	Johnson Cr Blvd at 92nd Ave Signalized	V/C		0.49	0.72
		LOS		C	C
4	Otty Rd/Idleman Rd at Bob Schumacher Rd/92nd Ave Signalized	V/C		0.55	0.68
		LOS		C	C
5	Idleman Rd at 92nd Ave Unsignalized (NB stop controlled)	V/C		0.10	0.18
		LOS		B	B
6	Hillcrest Rd at Stevens Rd Unsignalized (all-way stop controlled)	V/C		0.13	0.20
		LOS		A	A
7	Causey Ave at Bob Schumacher Rd Signalized	V/C		0.36	0.56
		LOS		A	A
8	Causey Ave at Stevens Rd Unsignalized (all-way stop controlled)	V/C	0.53		0.32
		LOS	B		A
9	William Otty Rd at Monterey Ave Roundabout (NB/EB/WB)	V/C	0.16		0.18
		LOS	overall: A, each approach: A/A/A		overall: A, each approach: A/A/A
10	William Otty Rd at Valley View Terr Unsignalized (all-way stop controlled)	V/C	0.10		0.28
		LOS	A		A
11	Monterey Ave at 82nd Ave Signalized	V/C	0.52	0.65	0.73
		LOS	B	C	C
12	Monterey Ave at Bob Schumacher Rd Signalized	V/C		0.46	0.58
		LOS		C	C
13	Monterey Ave at Stevens Rd Roundabout (NB/SB/EB/WB)	V/C	0.26		0.21
		LOS	overall: A, each approach: A/A/A/A		overall: A, each approach: A/A/A/A
14	Apt Driveway at Stevens Rd Unsignalized EB stop controlled	V/C	0.01		0.01
		LOS	A		A
15	Bob Schumacher Rd at Stevens Rd Signalized	V/C		0.42	0.43
		LOS		B	B

Table 7. Future (2021) Background Intersection Operations

Intersection			Operations		
			AM	MD	PM
16	Shopping Center at Stevens Rd Signalized	V/C		0.46	0.48
		LOS		B	B
17	Sunnyside Rd at 82nd Ave Signalized	V/C	0.67	0.79	0.93
		LOS	C	D	D
18	Sunnyside Rd at 93rd Ave Signalized	V/C		0.49	0.46
		LOS		B	B
19	Sunnyside Rd at I-205 SB Signalized	V/C	0.68	0.82	0.84
		LOS	C	D	C
20	Sunnyside Rd at I-205 NB Signalized (metered on-ramp)	V/C	0.81	0.79	0.84
		LOS	B	D	D
21	Sunnyside Rd at Stevens Rd Signalized	V/C		0.80	0.87
		LOS		C	D
22	Sunnyside Rd at Valley View Terr Signalized	V/C		0.60	0.63
		LOS		A	B
23	Sunnybrook Blvd at 82nd Ave Signalized	V/C	0.50		0.81
		LOS	B		C
24	Sunnybrook Blvd at I-205 SB Signalized (metered on-ramp)	V/C	0.43	0.40	0.56
		LOS	C	B	C
25	Sunnybrook Blvd at I-205 NB Signalized	V/C	0.45	0.48	0.76
		LOS	B	C	D

Notes: Cells shaded in grey indicate traffic analysis was not required for this time period

TEXT Cells shaded in black with bold white text indicate intersection exceeds operational standard

4.2.3. Future (2021) Background Traffic Queuing

The queuing results for the 2021 Background condition is intended to be a reference point for assessing the impacts of the trips generated by the proposed Eagle Landing development. Table F1 in Appendix F summarizes queue lengths within the study area and the available queuing storage for supplemental turn lanes. The queuing results indicate that the study area intersections are expected to be relatively congestion free with the exception of the 82nd Avenue corridor. The supplemental turn lanes that are expected to exceed their available storage are shown in **Table 8** below:

Table 8. Future (2021) Background 95th Percentile Queue Lengths by Movement

Intersection		Movement	Queue Length (ft)			Available Storage (ft)
			AM	Midday	PM	
1	Johnson Cr Blvd at I-205 SB	WBL	250		275	175
2	Johnson Cr Blvd at I-205 NB	WBL	200		175	175
3	Johnson Cr Blvd at 92nd Ave Signalized	EBL		200	360	175
		NBL		200	300	175
		SBL		-	150	115
		SBR		-	300	125
4	Otty Rd/Idleman Rd at Bob Schumacher Rd/92nd Ave Signalized	SBL		-	225	150
11	Monterey Ave at 82nd Ave Signalized	WBL	-	-	400	300
		NBL	-	150	175	125
		NBR	125	-	150	125
		SBL	-	300	450	350

Table 8. Future (2021) Background 95th Percentile Queue Lengths by Movement

Intersection		Movement	Queue Length (ft)			Available Storage (ft)
			AM	Midday	PM	
12	Monterey Ave at Bob Schumacher Rd Signalized	NBL		325	-	275
		SBTR		-	175	150
17	Sunnyside Rd at 82nd Ave Signalized	EBL	-	250	250	175
		EBR	-	275	425	225
		WBL	-	350	325	250
		NBL	-	450	450	350
		NBR	175	250	250	115
		SBL	-	400	400	320
		SBR	125	175	175	125
18	93rd Ave & Sunnyside Rd Signalized	WBL		200	200	200
19	Sunnyside Rd at I-205 SB Signalized	WBL	275	300	300	175
20	Sunnyside Rd at I-205 NB Signalized (metered on-ramp)	EBL	-	250	275	200
21	Sunnyside Rd at Stevens Rd Signalized	EBR		250	175	175
		WBL		175	-	175
		WBTR		375	375	260
		SBL		250	300	220
22	Sunnyside Rd at Valley View Terr Signalized	NBL		50	50	50
23	Sunnybrook Blvd at 82nd Ave Signalized	WBL	-		300	240
		NBR	-		575	570
		SBL	-		425	350
24	Sunnybrook Blvd at I-205 SB Signalized (metered on-ramp)	EBT	-	-	300	250
		WBL	175	175	175	130
25	Sunnybrook Blvd at I-205 NB Signalized	EBL	-	300	200	175
		NBR	-	-	725	400

5. Site Development Concept

The conceptual site plan, shown in **Figure 8**, depicts the most current concept of what the Eagle Landing development will look like once built. This TIS only analyzes the traffic impacts of the proposed 695,000 square feet of development on the east side of Stevens Road and is in alignment with the Master Plan application. Where the conceptual site plan might vary from standards, every attempt will be made through the later design review process to meet the applicable standards. Where this might not be feasible, requests for variances will be submitted. The Monterey connection between Stevens Road and Bob Schumacher Road is not assumed to be in place for this analysis. Both the New Hope Church and the Steven's Orchards Apartments are assumed to remain in place and their associated trips are accounted for in the existing traffic counts.

5.1. Access Point Spacing

The City of Happy Valley identifies access spacing standards in Table 1-4 of the City's TSP, and Clackamas County identifies these standards in section 220.4 of the County Roadway Standards. Where the proposed access points fail to meet the applicable standards, it is anticipated that a variance will be applied for through the design review process.

Monterey Avenue is designated by both Clackamas County and Happy Valley as a Collector. Table 1-4 of the City's TSP states that access spacing for full access should be a minimum of 400 feet, while the minimum drops to 200 feet for limited access intersections. Access spacing standards are referenced to the closest adjacent intersection or access point.

Access A: This stop controlled limited access (right-in/right-out) driveway is approximately 300 feet east of the Stevens Road at Monterey Avenue roundabout. (A design variance would not be required)

Access B: This stop controlled full access intersection is approximately 240 feet east of Access A. (A design variance would be required)

Access C: This stop controlled full access intersection is approximately 375 feet east of Access B. (A design variance would be required)

Access D: This stop controlled limited access (right-in/right-out) driveway is approximately 730 feet east of Access C. (A design variance would not be required)

As Stevens Road is designated by both Clackamas County and Happy Valley as a Collector, the minimum spacing of limited access intersections is defined as 200 feet.

Access E: This northbound limited access intersection (right-in/right-out only) is located approximately 360 feet south of the roundabout intersection of Stevens Road at Monterey Avenue and 440 feet north of the signalized intersection of Bob Schumacher Road at Stevens Road. This spacing meets the City's 200-foot requirement, it was intentionally offset due to the difference in anticipated queuing requirements between the roundabout (to the north) and the signal (to the south). (A design variance would not be required)



Figure 8: Conceptual Site Plan
Eagle Landing Mixed-use Community
Happy Valley, Oregon

5.2. Access Point Sight Distance

A sight distance analysis was completed for each of the proposed driveway locations and is discussed below. The access points will be designed to meet all applicable City of Happy Valley and Clackamas County sight distance requirements. AASHTO methodology was used to determine minimum sight distance requirements for driveway access points. Topographic survey data as well as scaled site plan designs were used to confirm that the access points meet the sight distance requirements based on the design speed of the given roadway. Access point sight distance should be re-analyzed and confirmed during the design review process as minimal detail is currently available to verify sight lines.

Table 3-1 of the current version of the *AASHTO – A Policy on Geometric Design of Highways and Streets* states that the stopping sight distance for roadways with design speeds of: 25 mph is 155 feet, 30 mph is 200 feet, 35 mph is 250 feet, and 40 mph is 305 feet. Accesses A through D will be on the existing stretch of Monterey Avenue east of Stevens Road, while Access E will be on Stevens Road just north of Bob Schumacher Road. These stretches of roadway have design speeds of 35 mph and a corresponding stopping sight distance requirement of 250 feet.

Access A: Due to the close proximity to the roundabout at the intersection of Stevens and Monterey, this access point is assumed to be right-in/right-out only. A stopped driver looking left for approaching vehicles would have an unimpeded sight distance of approximately 260 feet (exceeding the minimum requirement of 250 feet).

Access B: This access point is assumed full access with a stopped northbound approach. A stopped driver looking left or right would have an unimpeded sight distance of more than 350 feet (exceeding the minimum requirement of 250 feet).

Access C: This access point is assumed full access with a stopped northbound approach. A stopped driver looking left or right would have an unimpeded sight distance of more than 350 feet (exceeding the minimum requirement of 250 feet).

Access D: Due to the proximity to the reversing curves to the west and east on Monterey, this access point is assumed to be right-in/right-out only. A stopped driver looking left for approaching vehicles would have an unimpeded sight distance of approximately 265 feet (exceeding the minimum requirement of 250 feet).

Access E: Due to the close proximity to the intersections of Bob Schumacher Road at Stevens Road to the south, and Stevens Road at Monterey Avenue to the north, this access point has been developed as a northbound RIRO only. No left-turn movements will be allowed at this intersection. Drivers stopped on the east leg of the intersection will have at least 430 feet of unimpeded sight distance (exceeding the minimum requirement of 250 feet).

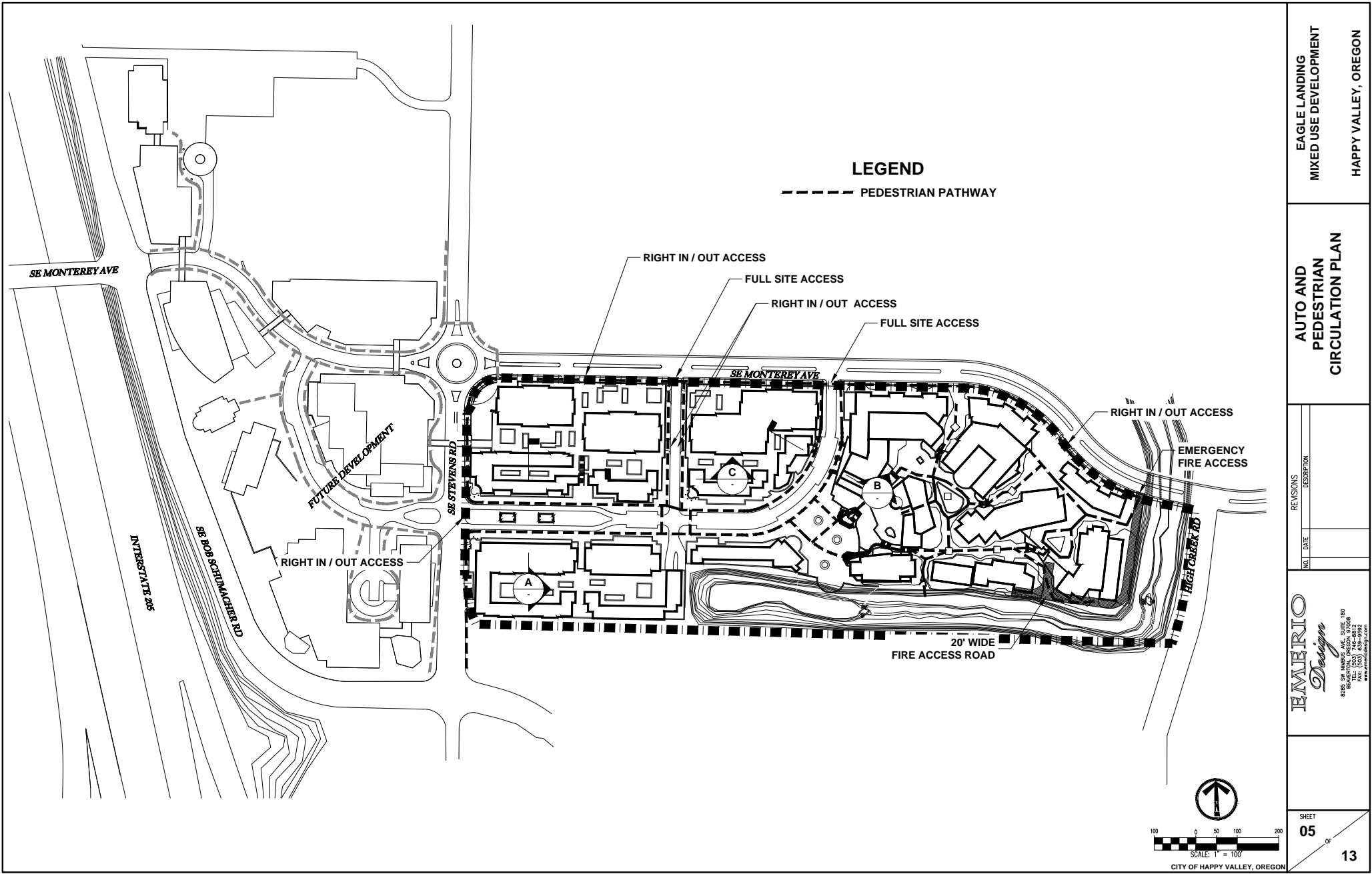
5.3. Pedestrian and Bicycle Access and Circulation

The Eagle Landing development has been designed with the utmost attention paid to creating the most livable, workable, playable multi-use development around. As such, all internal roadways are planned to have dedicated bicycle lanes and oversized pedestrian walkways. Most pedestrian areas are being designed to be at least ten feet wide, but in many cases 14 feet or more.

The City TSP identifies connectivity maximum requirements of 330 feet for bicycle and pedestrian connections. The site plan has been developed to provide for access to roadways adjacent to the site at approximately 200 to 250 foot intervals. The only area of the site where this high level of connectivity is not provided is along the southern edge of the property east of Stevens Road. In this area, the development will be built up to the edge of an existing natural area and adjacent to existing developments. As we cannot guarantee that adjacent property owners will grant access to this development, we have not shown access as being provided. However, our intent is to contact adjacent property owners to seek mutually beneficial bicycle and pedestrian access points between the Eagle Landing development and areas to the south. An additional site plan showing the location of pedestrian circulation routes is shown in **Figure 9**.

5.4. Location and Extent of On-Site Parking

Per the City Code, the Eagle Landing development will require 1,493 parking stalls. A conceptual layout showing the location and size of four parking lots/garages is shown in **Figure 10**. At this stage, the garages have not been fully laid out. It is expected that as tenants are identified for the various uses throughout the site, the layout of each individual garage will be developed and can then be reviewed and refined through the design review process.



LEGEND

----- PEDESTRIAN PATHWAY

EAGLE LANDING
MIXED USE DEVELOPMENT
HAPPY VALLEY, OREGON

AUTO AND PEDESTRIAN CIRCULATION PLAN

NO.	DATE	REVISIONS	DESCRIPTION

EMERIO
Design
8080 SW HANCOCK AVE., SUITE 180
PORTLAND, OREGON 97205
TEL: (503) 746-8812
WWW.EMERIODSIGN.COM

SHEET
05
OF
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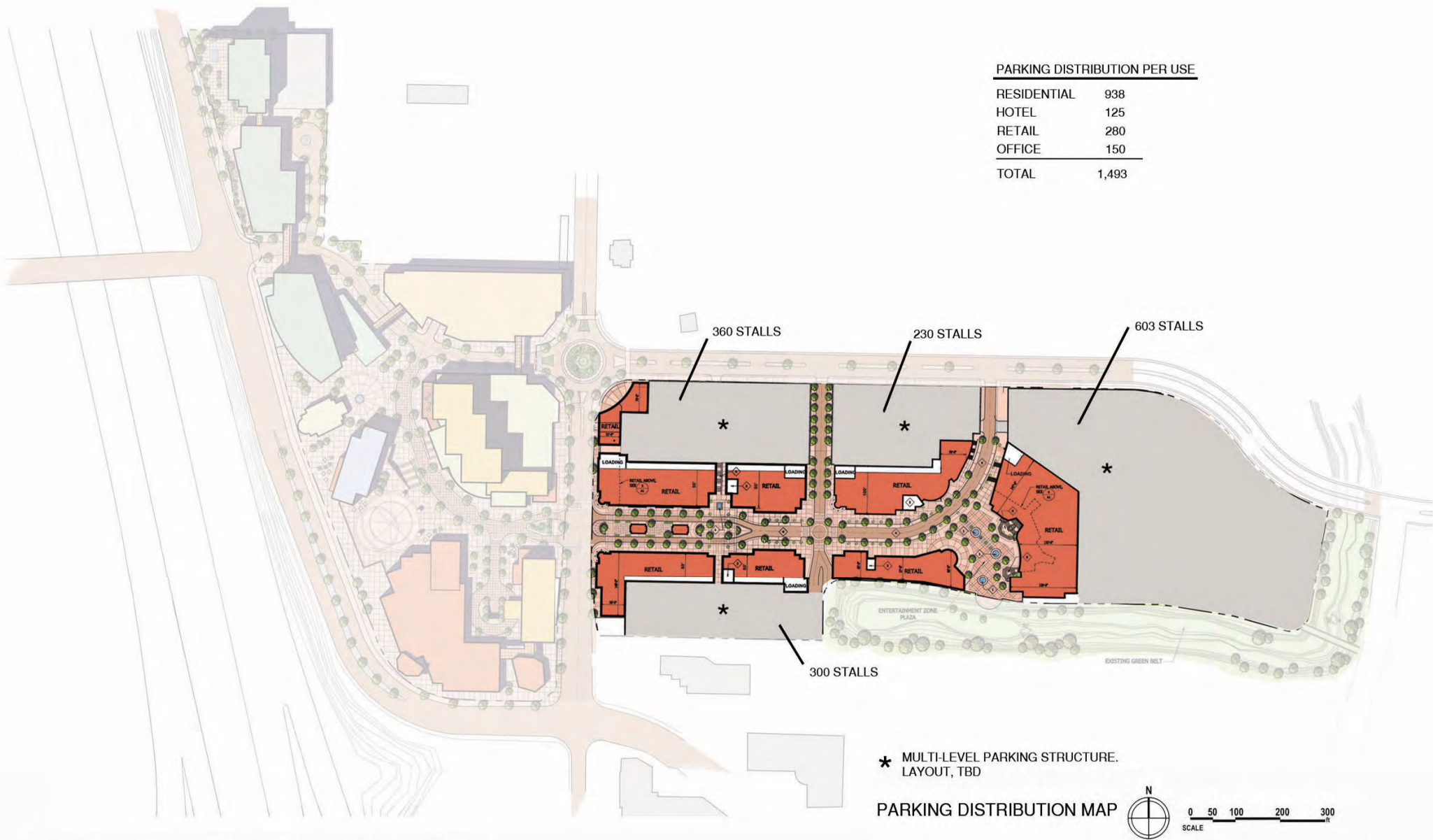


SCALE: 1" = 100'

CITY OF HAPPY VALLEY, OREGON

PARKING DISTRIBUTION PER USE

RESIDENTIAL	938
HOTEL	125
RETAIL	280
OFFICE	150
TOTAL	1,493



Eagle Landing Mixed-use Community Happy Valley, Oregon

6. Future (2021) Build

This section describes the traffic conditions within the study area if the 695,000 s.f. Eagle Landing development were to be built. This development is not expected to require any off site transportation infrastructure improvements. The potential design plan can be seen in **Figure 11**.

6.1. Future (2021) Build – Site Trip Generation

Trip generation for the Proposed Eagle Landing site involves multiple influencing factors. The proposed site plan encompasses the approved Eagle Landing site east of Stevens Road and south of Monterey Avenue in the currently vacant and unimproved lot. The Build traffic conditions reflect the background trips in addition to the trips that would be generated on the site with the build-out of the 695,000 s.f. Eagle Landing Mixed-Use Development.

The Institute of Transportation Engineers (ITE) report, Trip Generation, 9th Edition, was used to calculate the AM, midday, and PM peak hour trips. At the direction of Clackamas County staff, midday trip generation rates are based on the PM peak hour trip rates (as midday rates are not available from the ITE report). After the initial trip generation was estimated, trip reductions were applied to reflect pass-by trips to the site along with internal trips that are assumed to be made without the use of a car and remain entirely within the site.

6.1.1. Trip Reductions

The total trip generation estimate was reduced for both pass-by trips and internal trip capture. The mixed-use nature of the Eagle Landing development results in a reasonably high internal capture rate. The methodology outlined in the National Cooperative Highway Research Program (NCHRP) 684 was used to arrive at internal trip reduction percentages by land use. ITE defines internal trip reduction as:

“...a percentage reduction that can be applied to the trip generation estimates for individual land uses to account for trips internal to the site.”

The methodology in the ITE Trip Generation Handbook, 3rd Edition, was used to calculate pass-by trip volumes. The only use proposed for the Eagle Landing development that ITE provides a pass-by reduction for is the Shopping Center use. The other uses have a negligible (if any) percent of pass-by trips. The ITE Trip Generation Handbook discusses pass-by trips as:

“...made as intermediate stops on the way from an origin to a primary trip destination without a route diversion. Pass-by trips are attracted from traffic passing the site on an adjacent street or roadway that offers direct access to the generator. Pass-by trips are not diverted from another roadway.”

The following is an important note taken from the Trip Generation, 3rd Edition, Handbook:

“It is important to note that these [pass-by trip] reductions are applied externally to the site (i.e., at entrances, at adjacent intersections, and on adjacent roadways). The trip reduction for internally captured trips is separate from the reduction for pass-by trips. These are two distinct phenomena, and both could be applicable for a proposed development. The internal trips, if present, should be subtracted out before pass-by trip reductions are applied...”

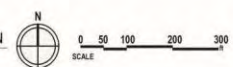
Figure 11

*Eagle Landing Mixed-Use
Community Land Use*



Eagle Landing Mixed-use Community
Happy Valley, Oregon

CONCEPTUAL MASTERPLAN



- Ⓐ Access Name
- Right-in/Right-out Access
- Full Movement Access

- Assumptions for New Development:
- 50,000 s.f. Office
 - 70,000 s.f. Retail
 - 125 unit Hotel
 - 500 Condominiums



Eagle Landing Mixed-use Development

6.1.2. Future (2021) Build – Peak Period Trip Generation

Table 9 depicts the total additional AM and Midday/PM peak hour network trips associated with the proposed Eagle Landing development (totaling 695,000 square feet) after the internal and pass-by trips were removed. Appendix G contains worksheets for the internal capture computations for the AM and Midday/PM peak hours.

Table 9. AM & Midday/PM Peak Hour Additional Network Trips Generated by the Proposed Development

Land Use	ITE Code	Area	AM Peak Hour			Midday/PM Peak Hour		
			Total	In	Out	Total	In	Out
Residential Condominium/ Townhouse	230	500 Units	220	42	178	260	166	94
Internal Trips ⁽¹⁾			5	1	4	82	60	22
Additional Network Trips			215	41	174	178	106	72
Hotel (Hotel)	310	125 Rooms	66	39	27	75	38	37
Internal Trips ⁽¹⁾			4	0	4	14	9	5
Additional Network Trips			62	39	23	61	29	32
General Office (Office)	710	50,000 S.F.	110	97	13	134	23	111
Internal Trips ⁽¹⁾			14	10	4	25	9	16
Additional Network Trips			96	87	9	109	14	95
Shopping Center (Retail)	820	70,000 S.F.	67	42	25	472	226	246
Internal Trips ⁽¹⁾			11	7	4	105	36	69
Pass-By Trips ⁽²⁾			N/A	N/A	N/A	125	65	60
Additional Network Trips			56	35	21	242	125	117
Trips Generated			463	219	244	941	454	487
Internal Trips ⁽¹⁾			34	18	16	226	114	112
Pass-By Trips ⁽²⁾			N/A	N/A	N/A	125	65	60
Total Additional Network Trips			429	201	228	590	275	315

Notes:

(1) Internal trips were calculated using the methodology used in NCHRP 684

(2) Pass-by trip were calculated with the methodology in the ITE Trip Generation Handbook, 3rd Edition. The associated pass-by percentage was calculated as 34%.

Source: ITE Trip Generation Manual, 9th Edition

6.2. Future (2021) Build – Trip Distribution

Trip distribution for the AM, Midday and PM peak periods is described below.

6.2.1. Peak Period Trip Distribution

The trip distribution assumed for this study was derived from a Metro Regional Travel Demand Model that was created for the Sunrise Corridor EIS. A select zone analysis was completed and then manual adjustments were made for known differences in congestion between existing conditions (2016) and the conditions present in the 2035 model. While the Sunrise Corridor EIS model is not the most current version of Metro's model, the zonal distribution patterns have not changed significantly. The detailed trip distribution percentages are shown in **Table 10**. **Figure 12** and **Figure 13** graphically depict an aggregation of the detailed trip distribution shown in **Table 10**. The total trips added to the network during the AM, Midday and PM peak hours under Build conditions are depicted for the study area intersections and accesses in **Figure 14** through **Figure 16**. Keep in mind that not all of the accesses were analyzed for every time period.

Table 10. AM & Midday/PM Peak Hour Trip Distribution

Direction	AM Peak Hour				Midday/PM Peak Hour			
	Residential		Commercial		Residential		Commercial	
	In	Out	In	Out	In	Out	In	Out
East on Hillcrest Rd via Stevens Rd	1%	1%	0%	0%	0%	0%	0%	0%
East on Idleman Rd via Stevens Rd	1%	1%	0%	0%	0%	1%	2%	2%
West on Otty Rd via Stevens Rd	4%	4%	0%	1%	4%	3%	2%	2%
East on Johnson Cr Blvd via Stevens Rd	1%	1%	0%	0%	0%	1%	0%	0%
North on 92 nd Ave via Stevens Rd	2%	1%	0%	0%	2%	1%	2%	2%
North on I-205 via Stevens Rd	6%	5%	1%	1%	5%	4%	2%	3%
West on Johnson Cr Blvd via Stevens Rd	1%	1%	0%	0%	1%	1%	1%	1%
East on Idleman Rd via Bob Schumacher Rd	1%	1%	0%	0%	1%	0%	0%	0%
West on Otty Rd via Bob Schumacher Rd	7%	6%	2%	3%	7%	5%	4%	2%
East on Johnson Cr Blvd via Bob Schumacher Rd	0%	0%	0%	0%	0%	0%	0%	0%
North on 92 nd Ave via Bob Schumacher Rd	3%	2%	1%	1%	4%	2%	1%	1%
North on I-205 at Johnson Cr Blvd via Bob Schumacher Rd	9%	8%	2%	3%	9%	7%	2%	2%
West on Johnson Cr Blvd via Bob Schumacher Rd	2%	2%	1%	1%	2%	2%	4%	1%
North on 82 nd Ave via Monterey Ave	0%	15%	0%	5%	0%	0%	0%	0%
West on Monterey Ave past 82 nd Ave	5%	4%	1%	1%	8%	8%	2%	2%
South on 82 nd Ave via Monterey Ave	0%	4%	0%	0%	0%	0%	0%	0%
South on 93 rd Ave via Sunnyside Rd	5%	4%	2%	3%	0%	6%	0%	2%
Clackamas Town Center via Sunnyside Rd	12%	9%	5%	8%	11%	12%	9%	5%
West on Sunnyside Rd	0%	0%	7%	9%	0%	0%	4%	4%
South on I-205 via Sunnyside Rd	0%	15%	15%	15%	7%	13%	9%	16%
South on 82 nd Ave via Sunnybrook Blvd	0%	0%	1%	5%	5%	0%	6%	3%
East on Sunnybrook Blvd	0%	0%	2%	0%	3%	0%	2%	0%
North on I-205 via Sunnyside Rd	16%	0%	21%	15%	10%	11%	16%	10%
Hospital	5%	5%	2%	8%	5%	5%	6%	8%
Graymor Shopping Center	0%	3%	0%	0%	5%	4%	0%	0%
East on Sunnyside Rd	14%	6%	36%	20%	7%	10%	25%	33%
East on William Otty Rd	5%	2%	1%	1%	4%	4%	1%	1%

6.3. Future (2021) Build – Traffic Volumes

The 2021 Build volumes were calculated by combining the trips generated by the proposed Eagle Landing development to the 2021 background traffic volumes. **Figure 17** through **Figure 19** depict the 2021 Build AM, Midday and PM turning movement volumes at the study area intersections and access points. Further details summarizing the development of the 2021 Build traffic volumes are found in Appendix E.

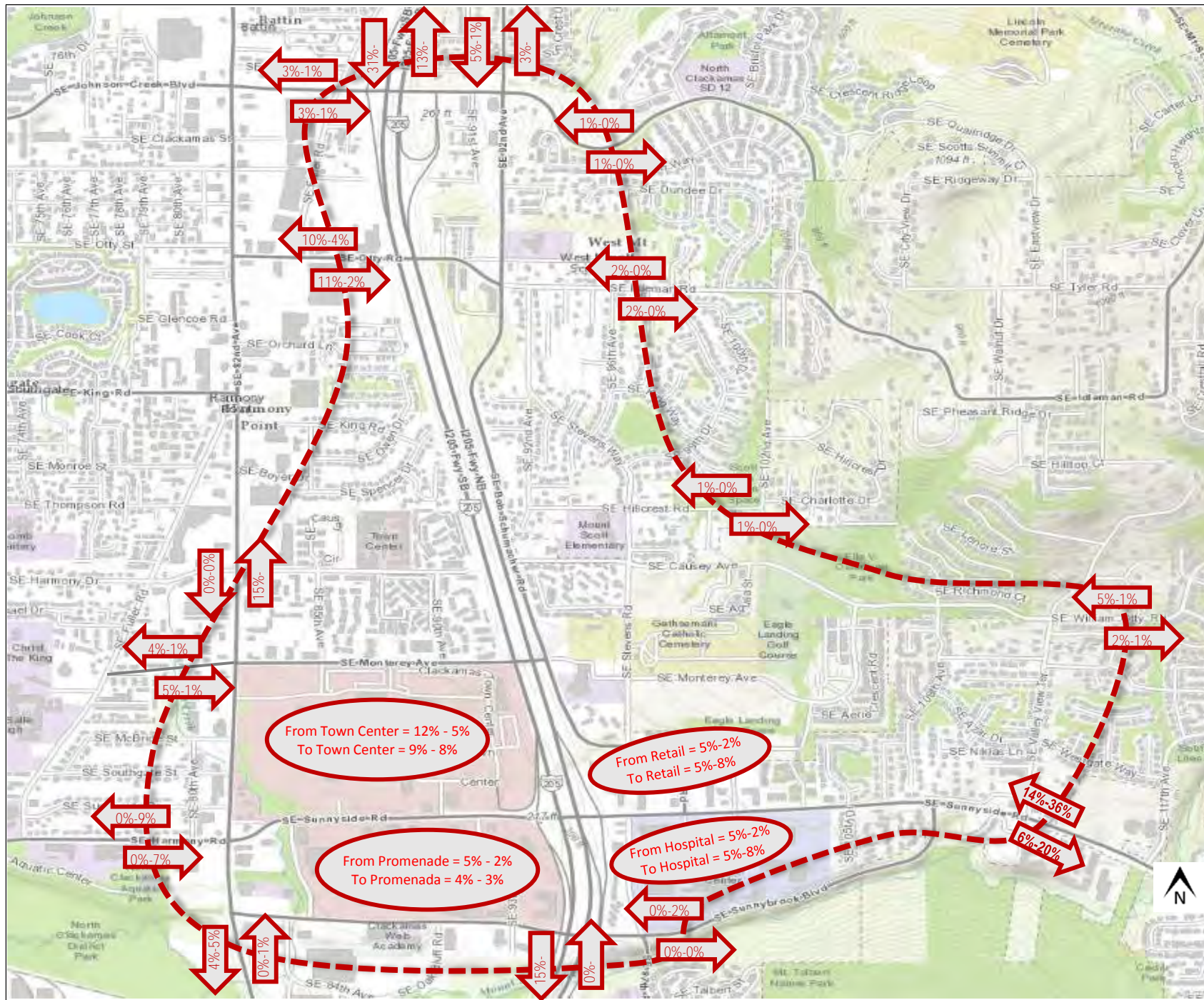


Figure 12

**AM Peak Hour
Trip Distribution**

Legend



Trip Distribution
Percentages
Residential - Commercial

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landing



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Eagle Landing Mixed-use
Development

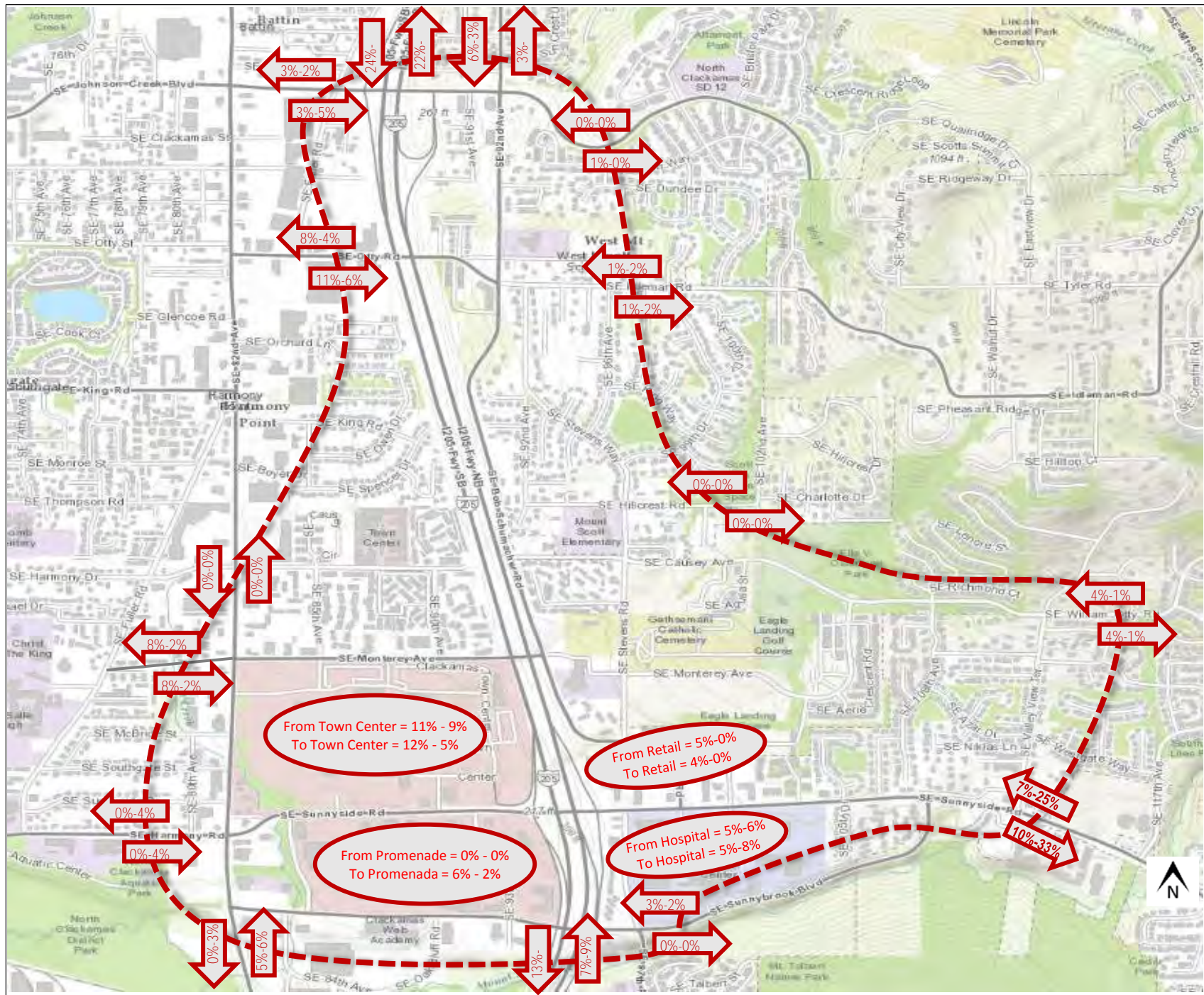


Figure 13

**Midday / PM
Peak Hour
Trip Distribution**

Legend



Trip Distribution
Percentages
Residential - Commercial

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**Eagle Landing Mixed-use
Development**

Figure 14

**Future (2021)
AM Peak Hour
Site Generated Trips**

Legend

- Turning Movement
- Peak Hour Volume
- TEV: Total Entering Volume
- STOP Control
- Signalized Intersection
- Roundabout
- Intersection Number
- Intersection not analyzed during this time period
- Right-in/Right-out Access
- Full Movement Access
- Proposed Development Site

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**Eagle Landing Mixed-use
Development**

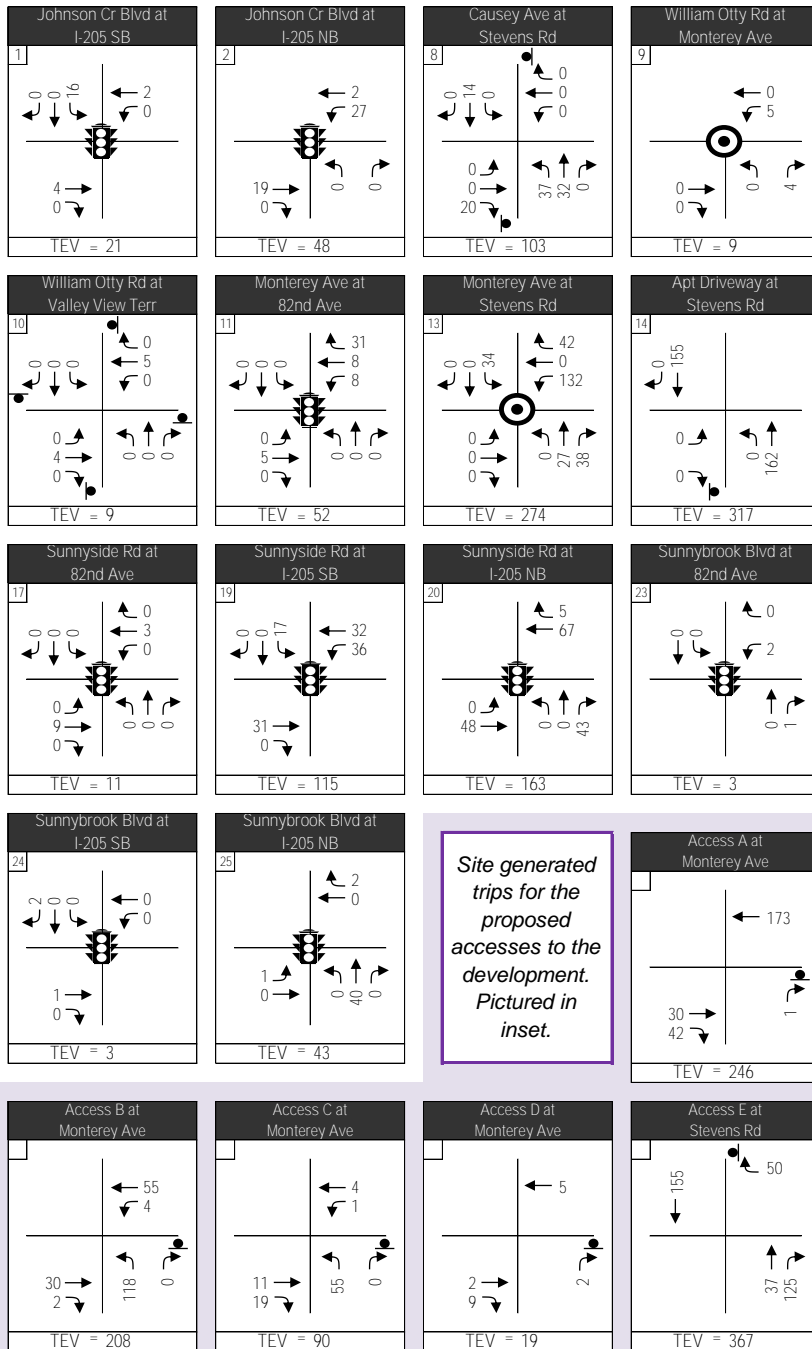
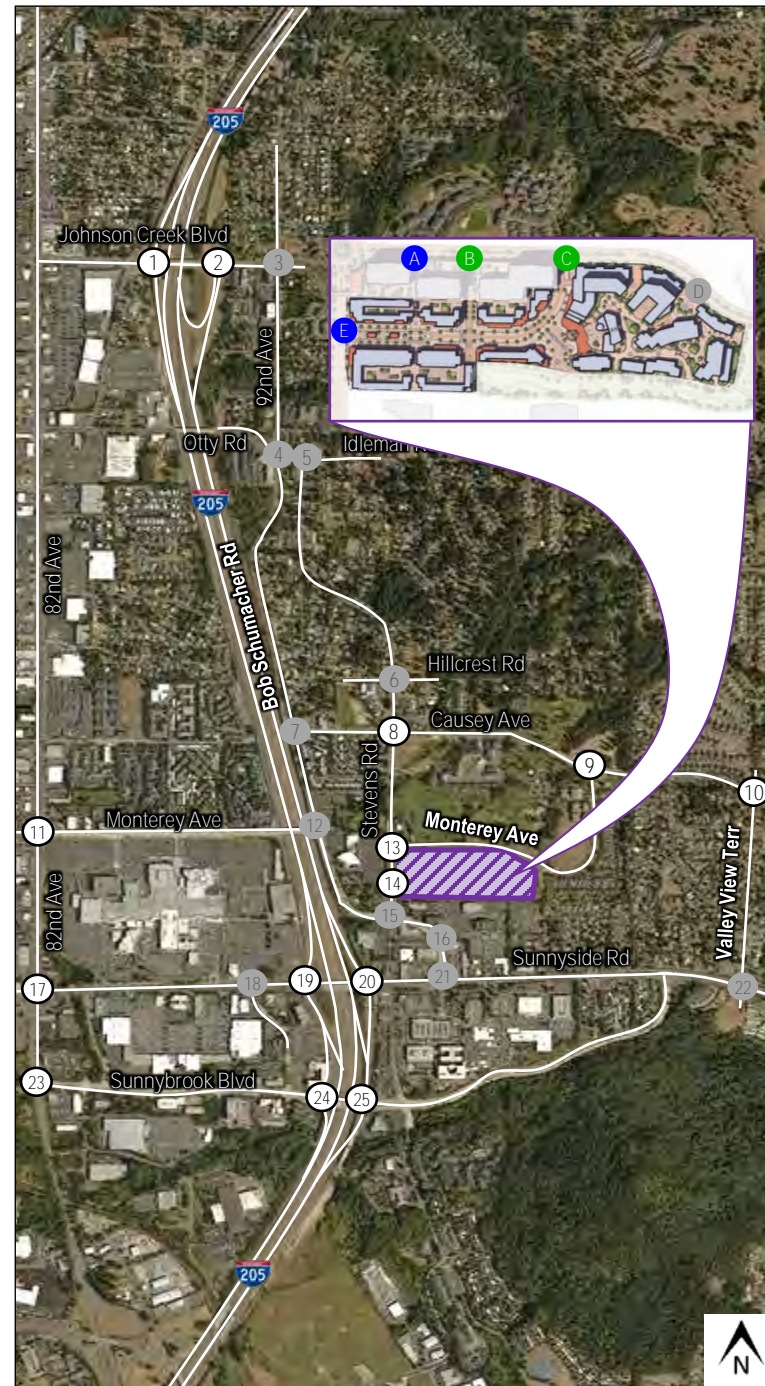
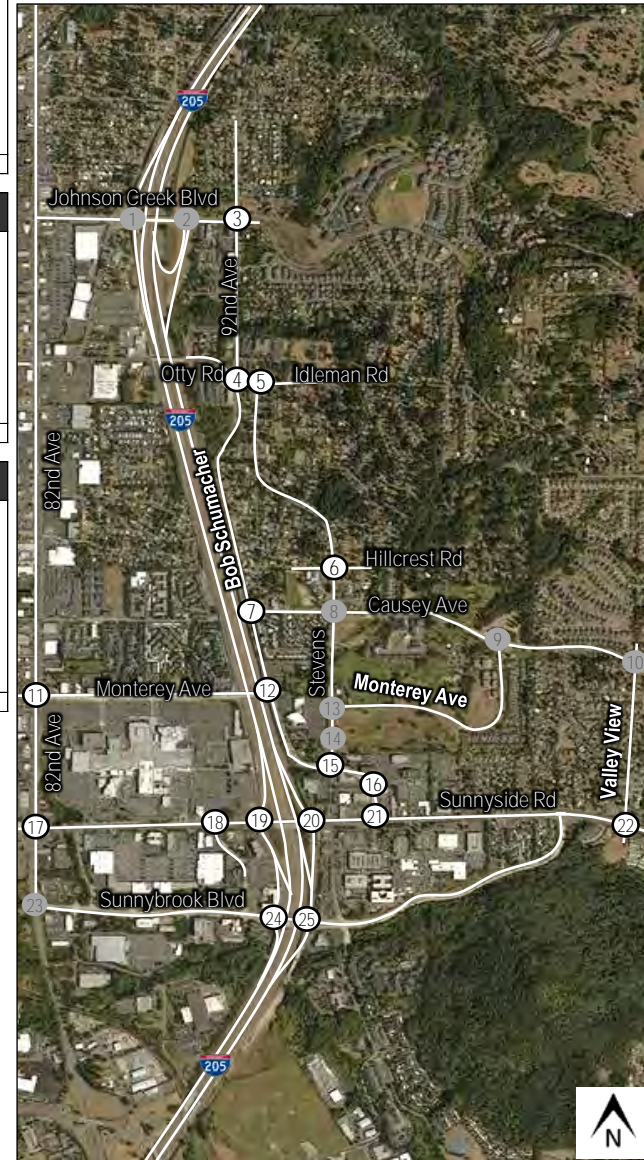
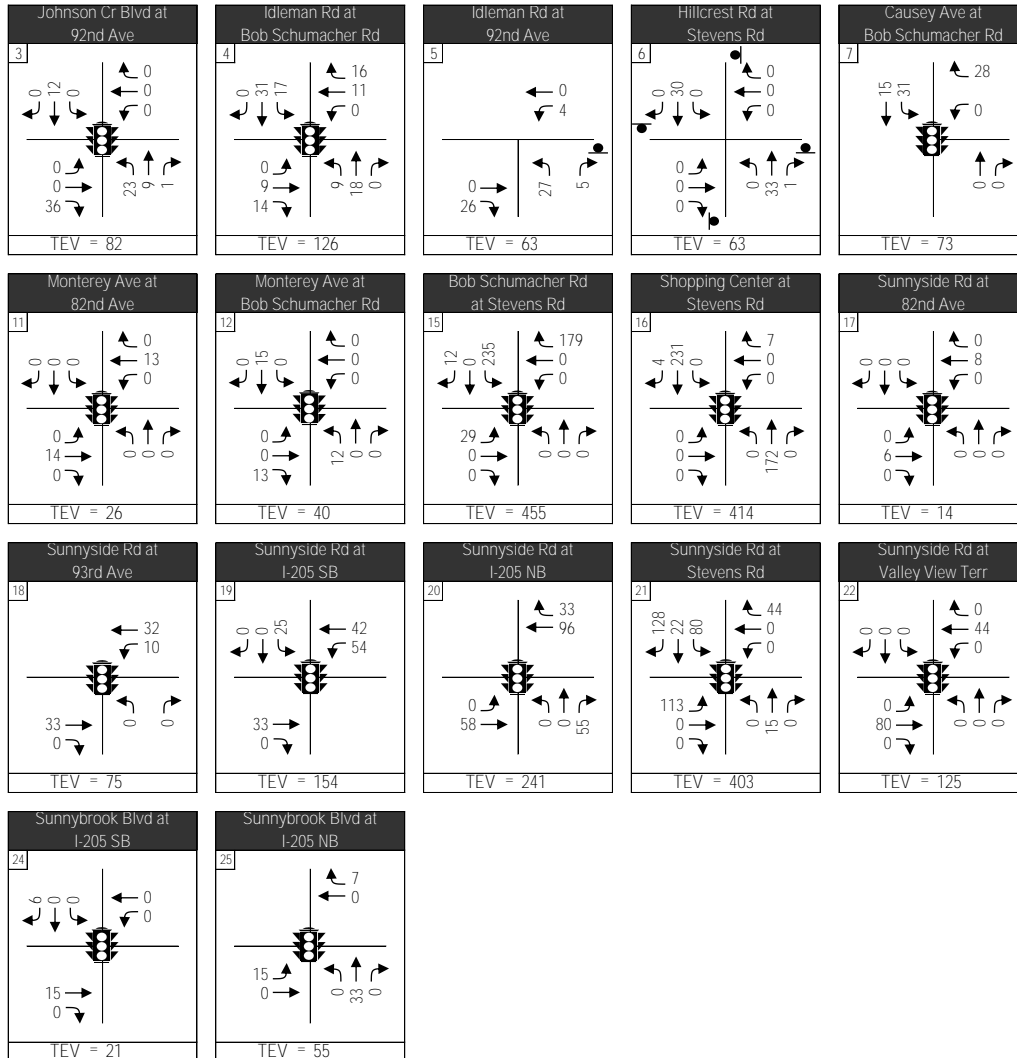


Figure 15

**Future (2021) Build
Midday Peak Hour
Site Generated Trips**

Legend

- Turning Movement
- ## Peak Hour Volume
- TEV: Total Entering Volume
- STOP Control
- Signalized Intersection
- Roundabout
- ① Intersection Number
- Intersection not analyzed during this time period



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**DAVID EVANS
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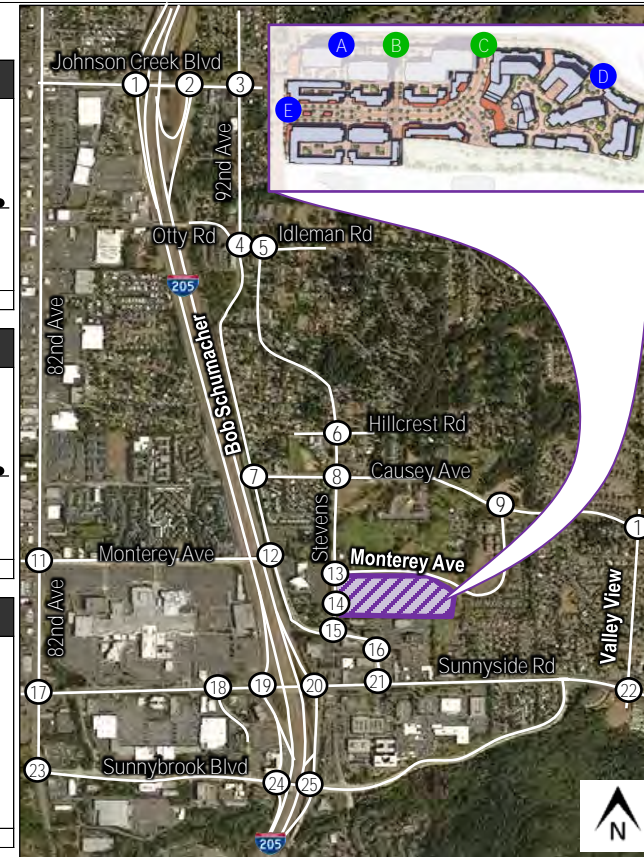
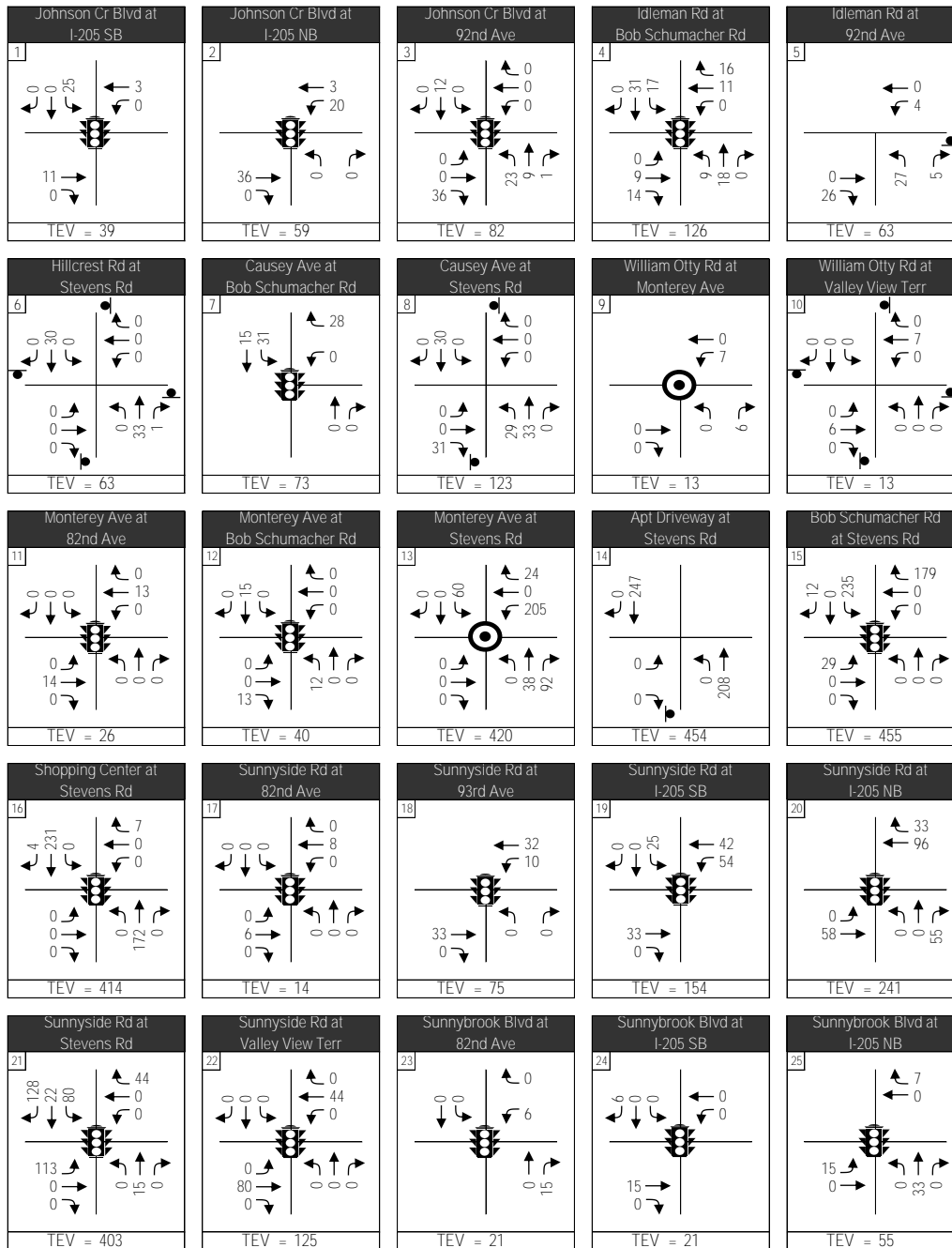
**Eagle Landing Mixed-use
Development**

Figure 16

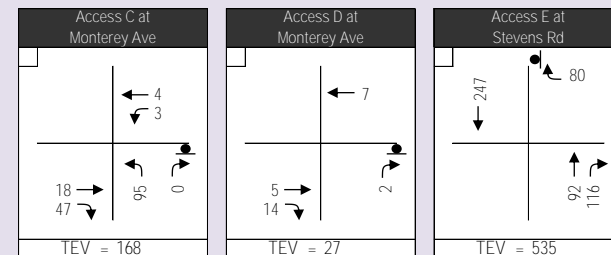
**Future (2021) Build
PM Peak Hour
Site Generated Trips**

Legend

- ➔ Turning Movement
- ## Peak Hour Volume
- TEV: Total Entering Volume
- STOP Control
- Signalized Intersection
- Roundabout
- ① Intersection Number
- Right-in/Right-out Access
- Full Movement Access
- Proposed Development Site



Site generated trips for the proposed accesses to the development. Pictured in inset.



eagle landing

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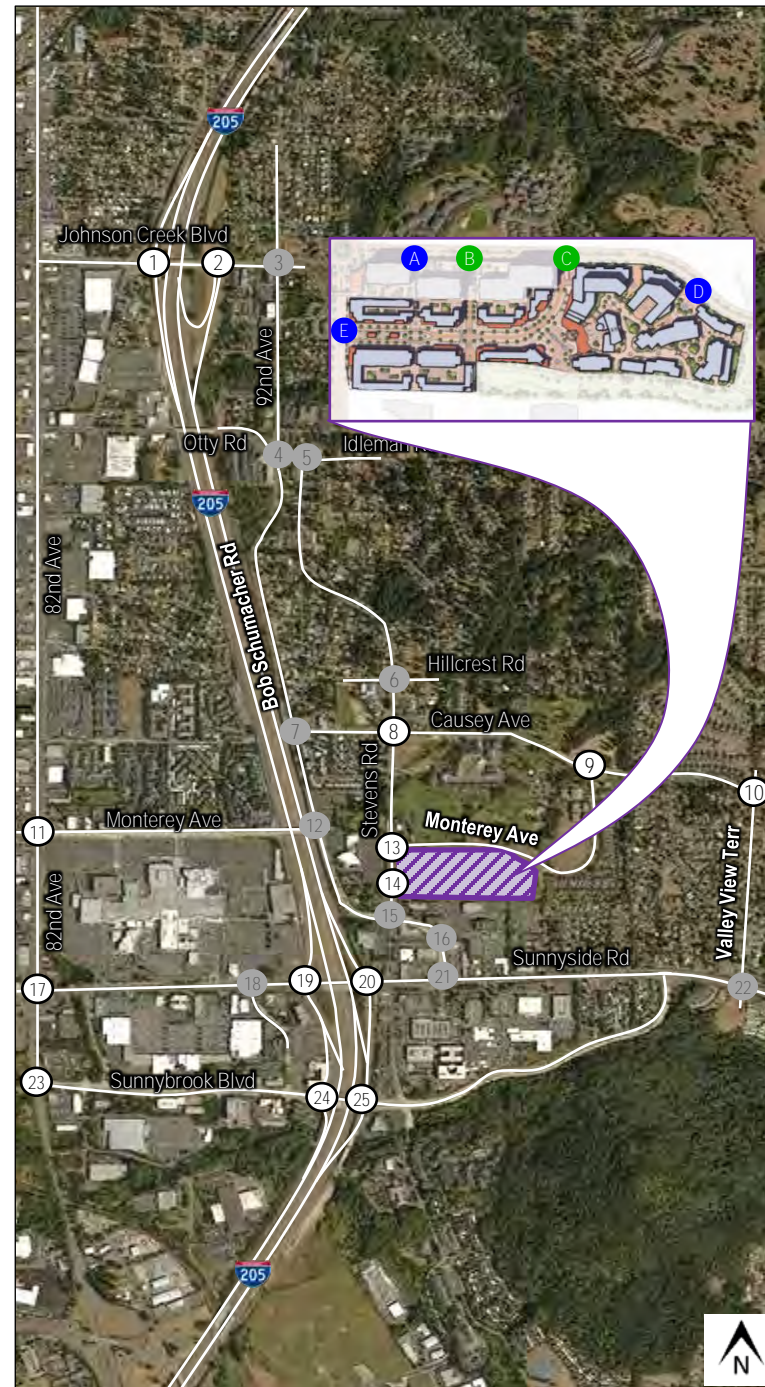
**Eagle Landing Mixed-use
Development**

Figure 17

Future (2021) Build
AM Peak Hour
Turning Movement
Volumes

Legend

- ➔ Turning Movement
- ## Peak Hour Volume
- TEV: Total Entering Volume
- STOP Control
- Signalized Intersection
- Roundabout
- ① Intersection Number
- Intersection not analyzed during this time period
- Right-in/Right-out Access
- Full Movement Access
- Proposed Development Site



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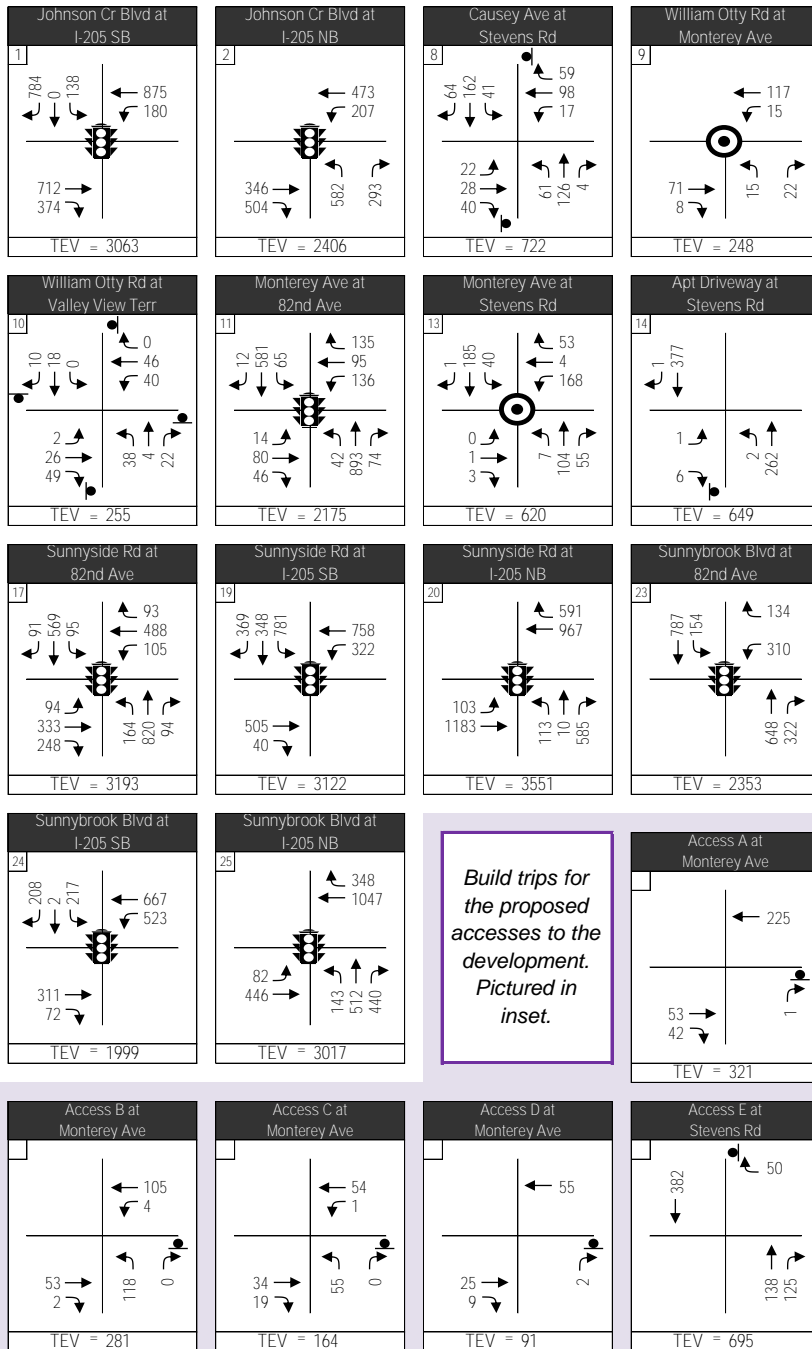
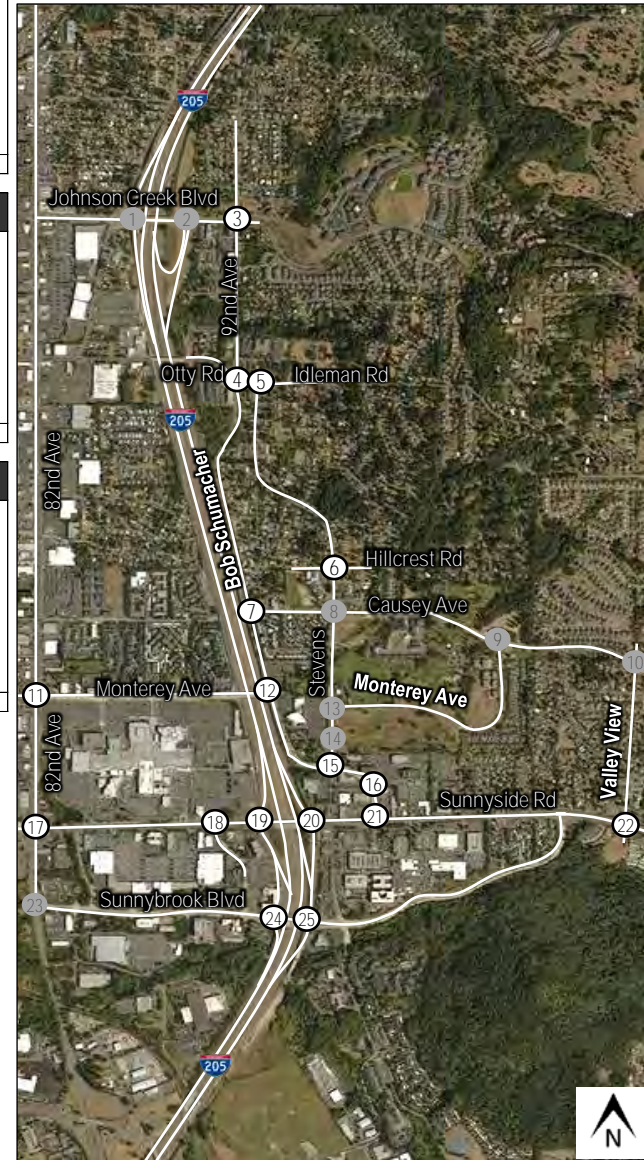
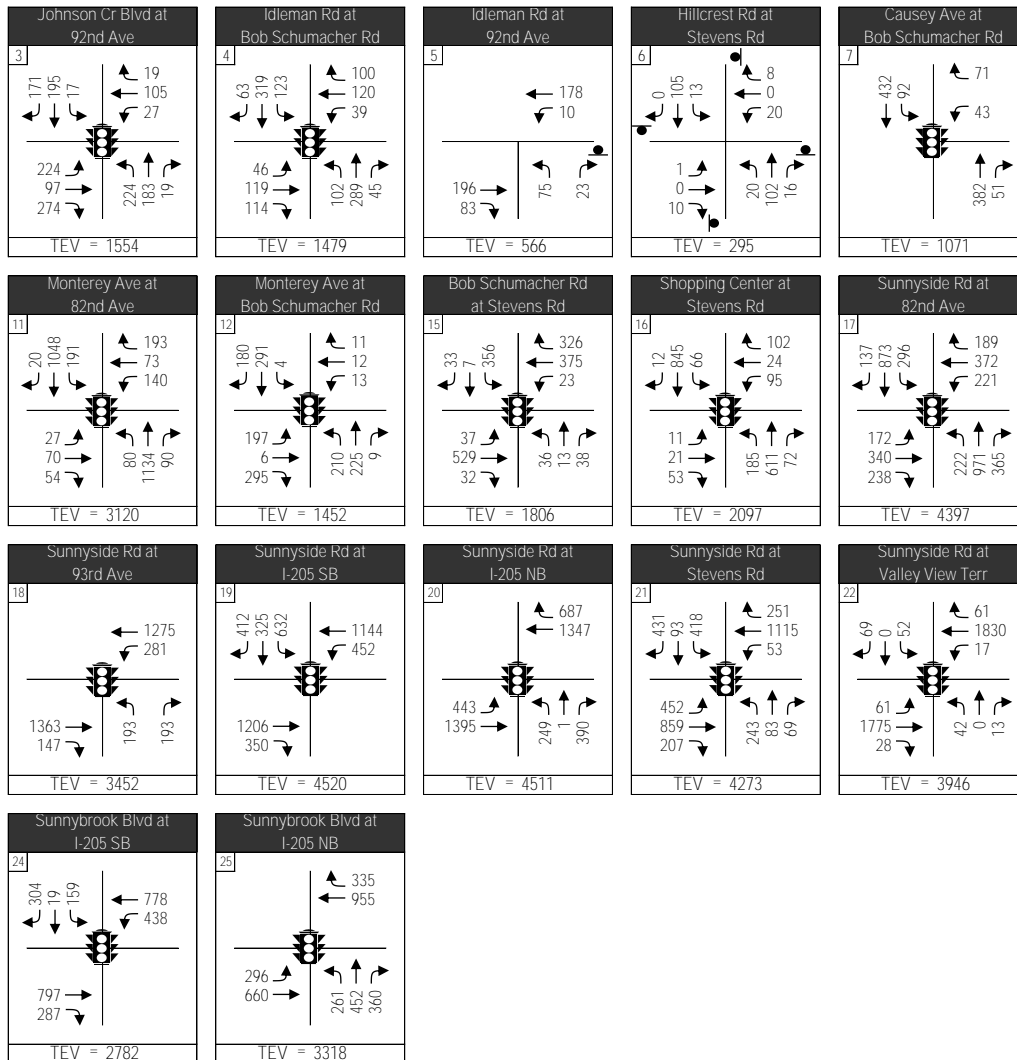


Figure 18

**Future (2021) Build
Midday Peak Hour
Turning Movement
Volumes**



Legend

- ➡ Turning Movement
- ## Peak Hour Volume
- TEV: Total Entering Volume
- STOP Control
- Signalized Intersection
- Roundabout
- ① Intersection Number
- Intersection not analyzed during this time period

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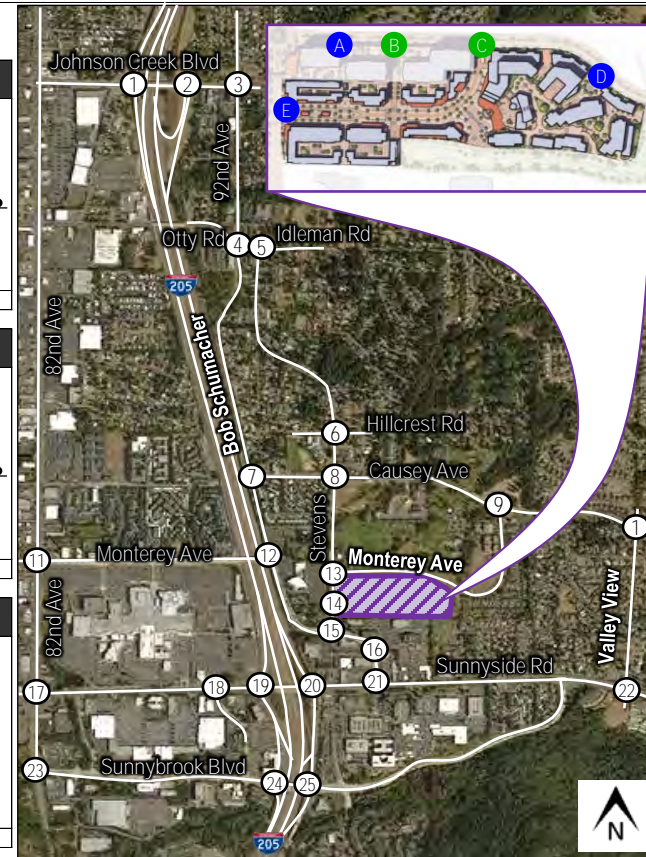
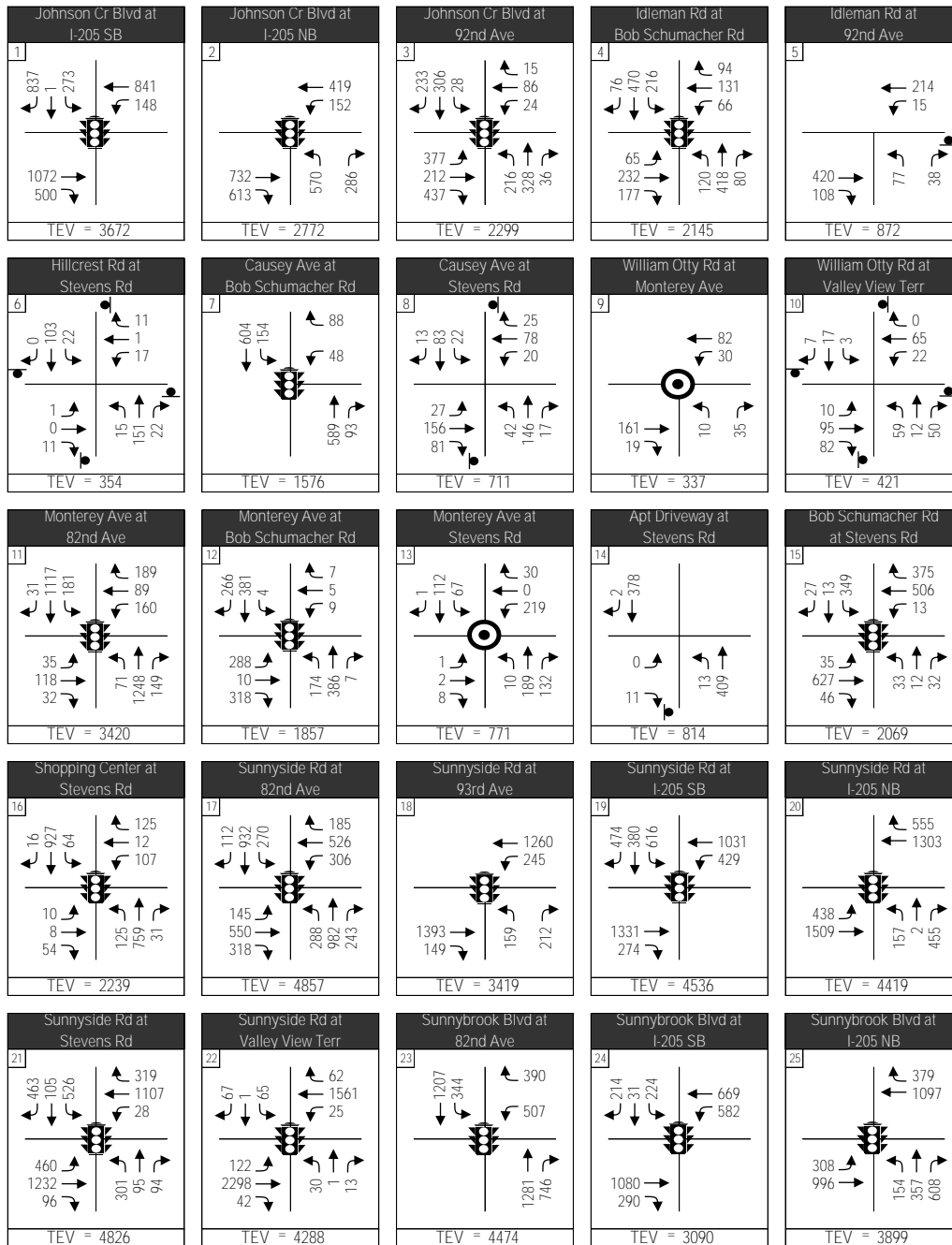
Eagle Landing Mixed-use
Development

Figure 19

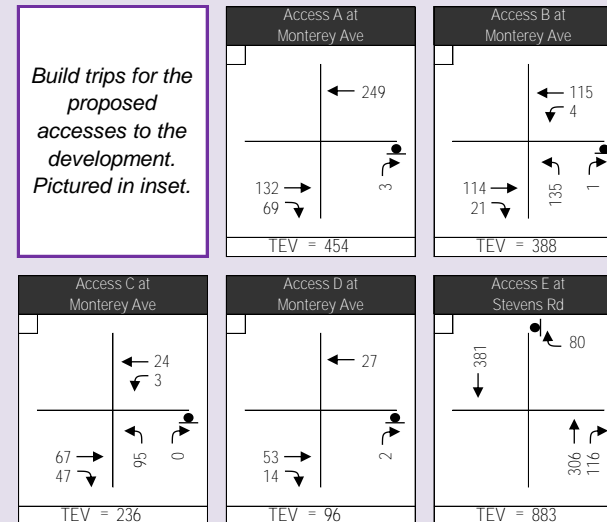
**Future (2021) Build
PM Peak Hour
Turning Movement
Volumes**

Legend

- ➔ Turning Movement
- ## Peak Hour Volume
- TEV: Total Entering Volume
- STOP Control
- Signalized Intersection
- Roundabout
- ① Intersection Number
- Right-in/Right-out Access
- Full Movement Access
- Proposed Development Site



Build trips for the proposed accesses to the development. Pictured in inset.



6.4. Future (2021) Build – Traffic Operations

Table 11 depicts the intersection operational results for the year 2021 Build traffic analysis. The full Synchro/SimTraffic outputs are contained in Appendix H.

All but one of the study area intersections meets the applicable operational performance standards under the 2021 Build conditions. The one exception is Johnson Creek Boulevard at the Southbound I-205 Ramp Terminal. This intersection is projected to operate at a V/C of 0.94 for the AM and PM peak hours. This number exceeds the acceptable performance standard of 0.90, however, because this intersection operates identically to the background analysis no mitigation is proposed.

Table 11. Future (2021) Build Intersection Operations

Intersection			Operations		
			AM	MD	PM
Study Area Intersections					
1	Johnson Cr Blvd at I-205 SB Signalized	V/C	0.94		0.94
		LOS	C		C
2	Johnson Cr Blvd at I-205 NB Signalized	V/C	0.57		0.59
		LOS	B		B
3	Johnson Cr Blvd at 92nd Ave Signalized	V/C		0.52	0.75
		LOS		C	C
4	Otty Rd/Idleman Rd at Bob Schumacher Rd/92nd Ave Signalized	V/C		0.60	0.71
		LOS		C	C
5	Idleman Rd at 92nd Ave Unsignalized (NB stop controlled)	V/C		0.16	0.25
		LOS		B	B
6	Hillcrest Rd at Stevens Rd Unsignalized (all-way stop controlled)	V/C		0.18	0.25
		LOS		A	A
7	Causey Ave at Bob Schumacher Rd Signalized	V/C		0.37	0.56
		LOS		A	A
8	Causey Ave at Stevens Rd Unsignalized (all-way stop controlled)	V/C	0.60		0.38
		LOS	B		B
9	William Otty Rd at Monterey Ave Roundabout (NB/EB/WB)	V/C	0.17		0.19
		LOS	overall: A, each approach: A/A/A/A		overall: A, each approach: A/A/A/A
10	William Otty Rd at Valley View Terr Unsignalized (all-way stop controlled)	V/C	0.11		0.29
		LOS	A		A
11	Monterey Ave at 82nd Ave Signalized	V/C	0.54	0.66	0.74
		LOS	B	C	C
12	Monterey Ave at Bob Schumacher Rd Signalized	V/C		0.47	0.60
		LOS		C	C
13	Monterey Ave at Stevens Rd Roundabout (NB/SB/EB/WB)	V/C	0.36		0.37
		LOS	overall: A, each approach: A/A/A/A		overall: A, each approach: A/A/A/A
14	Apt Driveway at Stevens Rd Unsignalized EB stop controlled	V/C	0.01		0.02
		LOS	B		A
15	Bob Schumacher Rd at Stevens Rd Signalized	V/C		0.67	0.69
		LOS		B	B
16	Shopping Center at Stevens Rd Signalized	V/C		0.55	0.56
		LOS		B	B
17	Sunnyside Rd at 82nd Ave	V/C	0.68	0.79	0.93

Table 11. Future (2021) Build Intersection Operations

Intersection			Operations		
			AM	MD	PM
	Signalized	LOS	C	D	E
18	Sunnyside Rd at 93rd Ave	V/C		0.50	0.46
	Signalized	LOS		B	B
19	Sunnyside Rd at I-205 SB	V/C	0.69	0.87	0.81
	Signalized	LOS	C	D	C
20	Sunnyside Rd at I-205 NB	V/C	0.84	0.82	0.90
	Signalized (metered on-ramp)	LOS	C	C	C
21	Sunnyside Rd at Stevens Rd	V/C		0.90	0.94
	Signalized	LOS		D	D
22	Sunnyside Rd at Valley View Terr	V/C		0.61	0.65
	Signalized	LOS		A	B
23	Sunnybrook Blvd at 82nd Ave	V/C	0.50		0.81
	Signalized	LOS	B		C
24	Sunnybrook Blvd at I-205 SB	V/C	0.43	0.40	0.56
	Signalized (metered on-ramp)	LOS	C	B	C
25	Sunnybrook Blvd at I-205 NB	V/C	0.46	0.49	0.76
	Signalized	LOS	B	C	D
Study Area Accesses					
A	Monterey Ave at Access A	V/C	0.01		0.01
	Unsignalized, NB stop controlled	LOS	A		A
B	Monterey Ave at Access B	V/C	0.16		0.21
	Unsignalized, NB stop controlled	LOS	B		B
C	Monterey Ave at Access C	V/C	0.07		0.12
	Unsignalized, NB stop controlled	LOS	A		A
D	Monterey Ave at Access D	V/C	0.01		0.01
	Unsignalized, NB stop controlled	LOS	A		A
E	Stevens Rd at Access E	V/C	0.07		0.13
	Unsignalized, WB stop controlled	LOS	A		B

Notes:

Cells shaded in grey indicate traffic analysis was not required for this time period

TEXT Cells shaded in black with bold white text indicate intersection exceeds operational standard

*V/C not reported, as there are no volumes at a stopped or yielding movement.

6.4.1. Future (2021) Build – Traffic Queuing

The queuing results for the 2021 Build condition are summarized in Table H-1 in Appendix H. When the PM peak hour was simulated in SimTraffic and compared to the future background scenario, the main difference in queuing was seen at the intersection of Sunnyside Road at Stevens Road in the southbound direction. The southbound queuing extended back onto Bob Schumacher Road past the intersection with Stevens Road. In some cases, queuing between Background and Build conditions improved. The Sunnyside Road corridor is expected to operate under adaptive signal timing, thus differences in signal timing between the background and build scenarios can be attributable to the differences seen the queuing results.

The turn movements that are expected to exceed their available storage are shown in **Table 12** below:

Table 12. Future (2021) Build 95th Percentile Queue Lengths by Movement

Intersection		Movement	Queue Length (ft)			Available
			AM	Midday	PM	Storage (ft)
Study Area Intersections						
1	Johnson Cr Blvd at I-205 SB Signalized (Ramp Terminal)	WBL	225		300	175
2	Johnson Cr Blvd at I-205 NB Signalized (Ramp Terminal)	WBL	225		225	175
3	Johnson Cr Blvd at 92nd Ave Signalized	EBL		200	250	175
		NBL		200	325	175
		SBL		-	150	115
4	Otty Rd/Idleman Rd at Bob Schumacher Rd/92nd Ave Signalized	NBL		-	225	200
		SBL		150	250	150
11	Monterey Ave at 82nd Ave Signalized	WBL	-	300	325	300
		NBL	-	150	150	125
		NBR	125	125	175	125
		SBL	-	375	375	350
12	Monterey Ave at Bob Schumacher Rd Signalized	NBL		350	300	275
		SBTR		150	200	150
15	Bob Schumacher Rd at Stevens Rd Signalized	SBL		225	-	170
16	Shopping Center at Stevens Rd Signalized	NBL		-	275	200
17	Sunnyside Rd at 82nd Ave Signalized	EBL	-	225	-	175
		EBR	-	375	425	225
		WBL	-	350	325	250
		NBL	-	450	450	350
		NBR	175	250	250	115
		SBL	-	375	400	320
		SBR	-	200	175	125
18	Sunnyside Rd at 93 rd Ave Signalized	WBL	-	200	200	200
19	Sunnyside Rd at I-205 SB Signalized (Ramp Terminal)	WBL	300	275	325	175
20	Sunnyside Rd at I-205 NB Signalized (Ramp Terminal)	EBL	-	300	250	200
21	Sunnyside Rd at Stevens Rd Signalized	EBR		250	-	175
		WBL		175	-	175
		WBR		375	375	260
		SBL		300	300	220
23	Sunnybrook Blvd at 82nd Ave Signalized	WBL	-		300	240
		NBR	-		675	570
		SBL	-		425	350
24	Sunnybrook Blvd at I-205 SB Signalized (Ramp Terminal)	EBT	-	-	300	250
		WBL	175	175	175	130
25	Sunnybrook Blvd at I-205 NB Signalized (Ramp Terminal)	EBL	50	175	225	175
		NBL	400	-	-	400
		NBR	575	-	725	400

7. Prior Zone Change Conditions of Approval

In previous studies, the “Eagle Landing Area” consisted of the property included in this TIS as well as a portion of the land on the west side of Stevens Road, north and east of Bob Schumacher Road and south of Causey Avenue. The New Hope Church as well as the Steven’s Orchards Apartments currently occupy this additional portion of land.

In 2012, a zone change of both the properties included in this TIS and the additional properties to the west of Stevens Road was approved with conditions. Prior to 2012, the zoning allowed for the construction of up to 750,000 square feet of development without any conditions. After 2012, the zoning allowed for the construction of up to 2,100,000 square feet of development with the construction of mitigation measures that were identified as conditions of approval.

As this TIS summarizes the impacts of the first 695,000 square feet of development, it is assumed that the mitigations identified in the zone change completed in 2012 will only apply to development levels beyond the 750,000 square foot threshold.

A parallel application to amend the 2012 zone change conditions of approval is being submitted to the City of Happy Valley that will amend the conditions of approval to apply to any development beyond the previously approved 750,000 square feet. As such, no horizon year 2035 analysis has been completed within this TIS.

8. Conclusions and Recommendations

Based on the findings of the TIS, the proposed Eagle Landing Development (consisting of 500 residential condominiums, a 125 room hotel, 50,000 square feet of Office, and 70,000 square feet of Retail) can be constructed by the year 2021 without causing any study area intersections to fail to meet the applicable operational standards. It is recommended that the City of Happy Valley, Clackamas County, and ODOT approve the Eagle Landing master plan without any transportation related off-site conditions.