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MEMORANDUM

Date:	March 16, 2020	**TG:**	18358.00
To:	Steven Leniszewski – City of Duvall		
From:	Paul Sharman, PE – Transpo Group		
cc:	Patrick Lynch, AICP – Transpo Group		
Subject:	City of Duvall Origin Destination Study		

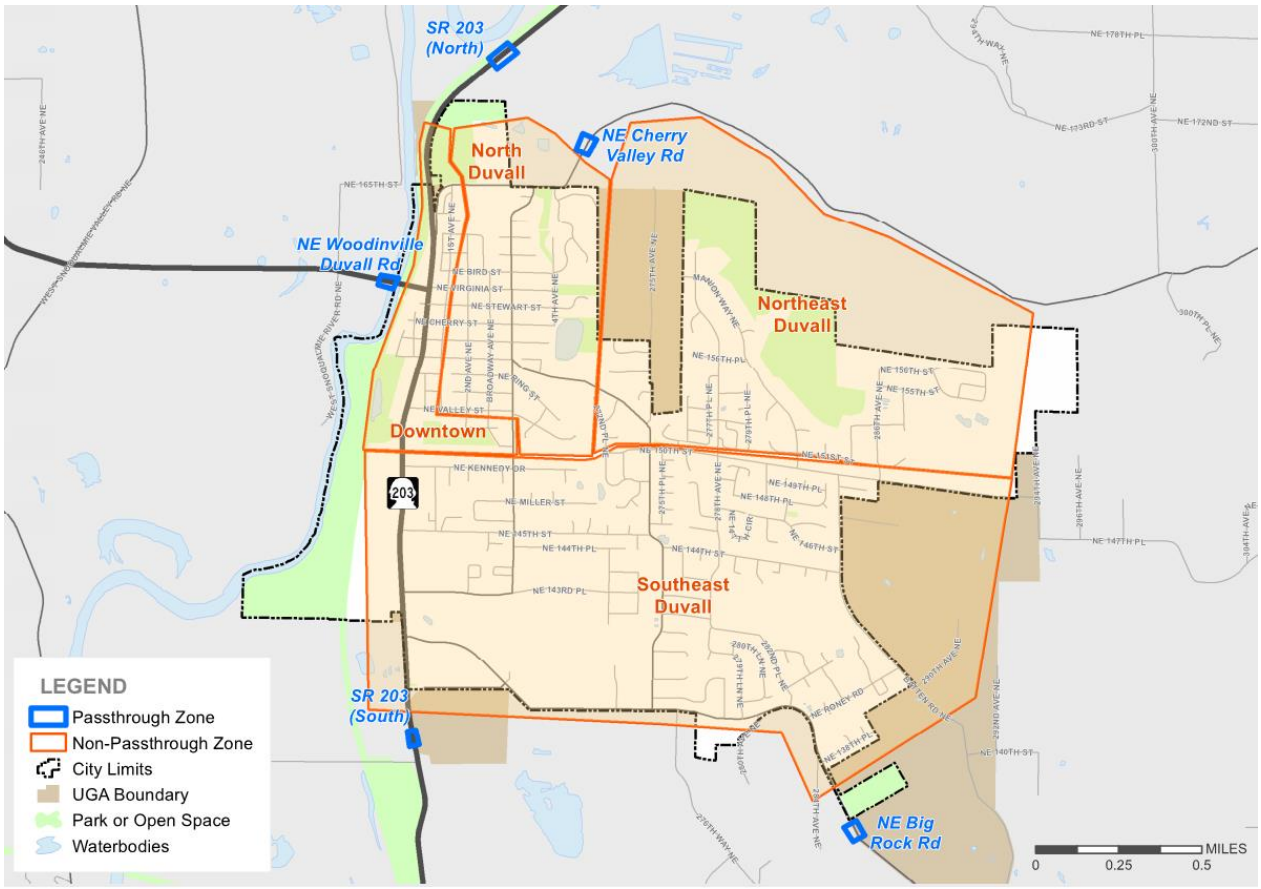
The purpose of this memorandum is to summarize the results of the origin-destination (OD) study conducted in the City of Duvall. This study was done in order to understand the general traffic patterns around the City of Duvall, especially traffic along SR 203, and what percentage of that traffic were Duvall residents responsible for. To help answer these questions, Transpo Group used *Streetlight Data*, a company that buys GPS probe data and summarizes it in an online platform to help users understand traffic patterns.

Streetlight Data Analysis Process

Streetlight Data works by collecting GPS data from a variety of sources, and then processing these data points to understand which roadways these GPS points are traveling on. Users can purchase access to their online platform where the analysis is conducted. The analysis is done by drawing 'zones' through which trips are measured. Zones are set up as either pass-through or non-pass through. Pass-through zones will count all traffic that moves through the zone, while non pass-through zones will only count trips that start or end within the zone. Figure 1 shows the zone layout in the City of Duvall for this analysis.

Streetlight Data also has the capability to conduct other analytics, outside of general OD analysis. *Streetlight Data* can estimate average annual daily traffic (AADT) along roadways, showcase top routes between OD pairs, perform select link analyses like those done in a typical travel demand model, as well as leverage census data to build traveler profiles of those using roadways. This analysis is all done without roadside sensors, only using probe data and publicly available datasets (such as census data).

Figure 1 - City of Duvall Streetlight Zones



As shown in Figure 1, there are nine zones created for the OD analysis. The analysis was done using three months of data from Fall 2019 (September, October and November). The following time periods were analyzed:

- Average Weekday AM Peak Period (7-9 AM)
- Average Weekday Mid-day (11 AM – 1 PM)
- Average Weekday PM Peak Period (4-6 PM)
- Average Saturday Mid-day (11 AM – 1 PM)

For each of the time periods shown above, an origin-destination matrix was prepared. The results are summarized below.

Origin-Destination Results

The origin-destination results for each of the scenarios shown above, are summarized in Tables 1 through 4. Table 1 summarizes the origin-destination patterns occurring on an average weekday in Fall 2019 during the AM peak period (7-9 AM).

Table 1. Average Weekday (Tue-Thur) AM Peak Period Origin-Destination Matrix

		Destination Zone								
		Downtown	NE Big Rock Rd	NE Cherry Valley Rd	NE Woodinville Duvall Rd	North Duvall	NE Duvall	SE Duvall	SR 203 North	SR 203 South
Origin Zone	Downtown	-	3%	5%	22%	3%	9%	17%	6%	35%
	NE Big Rock Rd	12%	-	2%	14%	2%	9%	20%	6%	36%
	NE Cherry Valley Rd	17%	0%	-	34%	2%	16%	9%	4%	18%
	NE Woodinville Duvall Rd	28%	5%	5%	-	6%	16%	14%	12%	14%
	North Duvall	4%	0%	1%	24%	-	13%	10%	4%	42%
	NE Duvall	3%	0%	0%	13%	5%	-	13%	2%	64%
	SE Duvall	6%	6%	1%	12%	3%	20%	-	3%	50%
	SR 203 North	8%	1%	1%	47%	1%	0%	5%	-	37%
	SR 203 South	11%	3%	0%	8%	9%	22%	22%	26%	-

For vehicles traveling southbound on SR 203 just north of Duvall, 47 percent turn right onto NE Woodinville and 37 percent continue south through Duvall on SR 203.

Table 2 summarizes the origin-destination patterns occurring on an average weekday in Fall 2019 during the mid-day peak period (11 AM - 1 PM).

Table 2. Average Weekday (Tue-Thur) Mid-day Origin-Destination Matrix

		Destination Zone								
		Downtown	NE Big Rock Rd	NE Cherry Valley Rd	NE Woodinville Duvall Rd	North Duvall	NE Duvall	SE Duvall	SR 203 North	SR 203 South
Origin Zone	Downtown	-	3%	13%	18%	6%	10%	23%	8%	19%
	NE Big Rock Rd	13%	-	1%	14%	3%	1%	32%	17%	19%
	NE Cherry Valley Rd	31%	1%	-	27%	5%	3%	18%	9%	6%
	NE Woodinville Duvall Rd	22%	2%	12%	-	10%	5%	18%	24%	7%
	North Duvall	11%	2%	5%	17%	-	13%	16%	13%	24%
	NE Duvall	13%	1%	6%	15%	8%	-	23%	3%	33%
	SE Duvall	19%	6%	5%	15%	7%	9%	-	6%	35%
	SR 203 North	15%	2%	6%	26%	4%	3%	12%	-	32%
	SR 203 South	17%	2%	3%	5%	10%	11%	32%	19%	-

Table 3 summarizes the origin-destination patterns occurring on an average weekday in Fall 2019 during the PM peak period (4-6 PM).

Table 3. Average Weekday (Tue-Thur) PM Peak Period Origin-Destination Matrix

		Destination Zone								
		Downtown	NE Big Rock Rd	NE Cherry Valley Rd	NE Woodinville Duvall Rd	North Duvall	NE Duvall	SE Duvall	SR 203 North	SR 203 South
Origin Zone	Downtown	-	4%	10%	18%	5%	9%	24%	17%	13%
	NE Big Rock Rd	18%	-	0%	14%	7%	3%	46%	5%	7%
	NE Cherry Valley Rd	30%	1%	-	19%	10%	2%	11%	25%	3%
	NE Woodinville Duvall Rd	13%	2%	11%	-	10%	8%	16%	38%	3%
	North Duvall	14%	2%	8%	14%	-	19%	21%	10%	12%
	NE Duvall	23%	2%	2%	12%	8%	-	22%	5%	25%
	SE Duvall	20%	7%	4%	13%	8%	15%	-	9%	23%
	SR 203 North	8%	3%	9%	19%	5%	7%	12%	-	36%
	SR 203 South	11%	4%	3%	3%	9%	16%	32%	23%	-

Table 4 summarizes the origin-destination patterns occurring on an average Saturday in Fall 2019 during the mid-day (11AM – 1PM).

Table 4. Saturday Mid-Day Origin-Destination Matrix

		Destination Zone								
		Downtown	NE Big Rock Rd	NE Cherry Valley Rd	NE Woodinville Duvall Rd	North Duvall	NE Duvall	SE Duvall	SR 203 North	SR 203 South
Origin Zone	Downtown	-	3%	8%	20%	5%	7%	20%	16%	21%
	NE Big Rock Rd	21%	-	0%	18%	3%	3%	21%	13%	22%
	NE Cherry Valley Rd	13%	1%	-	41%	5%	3%	9%	14%	14%
	NE Woodinville Duvall Rd	14%	4%	15%	-	5%	13%	17%	25%	7%
	North Duvall	10%	0%	4%	22%	-	6%	17%	14%	27%
	NE Duvall	11%	1%	1%	20%	4%	-	18%	9%	36%
	SE Duvall	14%	3%	2%	15%	6%	8%	-	10%	42%
	SR 203 North	9%	4%	5%	21%	4%	6%	17%	-	35%
	SR 203 South	13%	3%	3%	4%	9%	12%	28%	27%	-

Results from Tables 1 through 4 are difficult to put into context on their own. The following section compares these results to the results of a similar 2009 origin-destination study.

Comparison to Previous Study

A similar origin-destination study was conducted in 2009 during a weekday PM peak period. That study was done using license-plate readers instead of *Streetlight Data.* The PM peak period results of the 2009 study and the 2020 study (using 2019 data) are compared in the figures below. The methodology used in the previous study (one day of license plate readers) differ greatly from two months of probe data from *Streetlight Data.* Comparisons between 2009 and 2019 results will be discussed below. The differences between the results should stem largely from changes in traffic patterns but may also include some variation due to differing methodologies.

Figure 2 - PM Peak Period Origin-Destination Pairs from SR 203 North

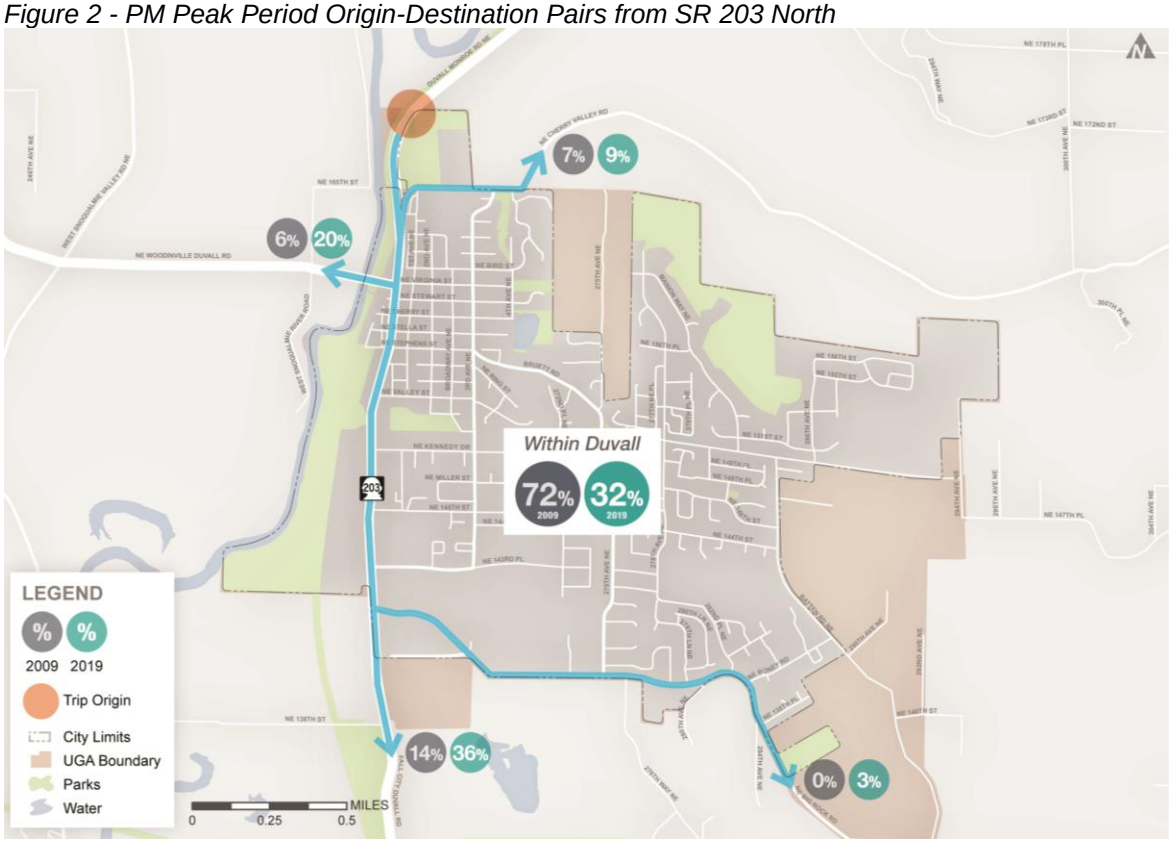
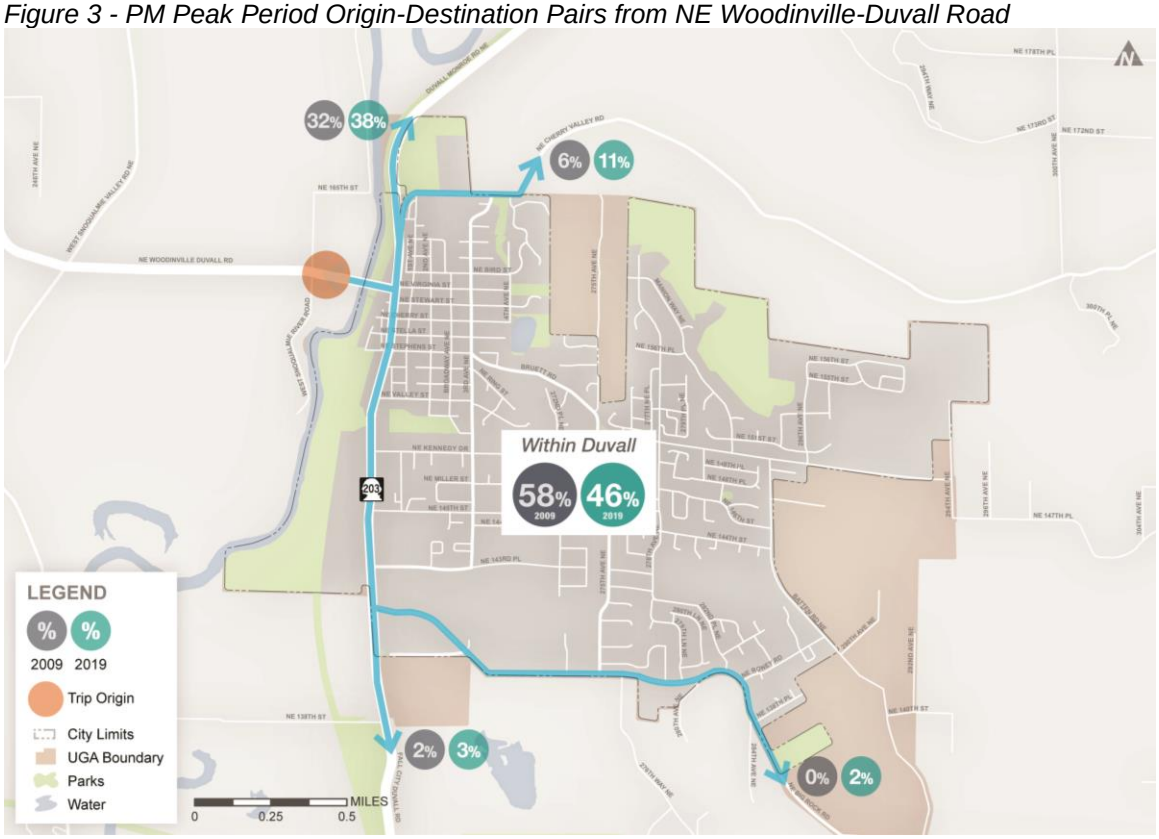


Figure 2 shows the trips traveling into the study area from SR 203, north of Duvall. The difference between 2009 and 2019 data suggests that fewer vehicles are destined to the City of Duvall, with the primary increase occurring in travel heading west on Woodinville-Duvall Rd and south on SR 203. This suggests that SR 203 is functioning more as a regional roadway in 2019 than it did in 2009.

Figure 3 shows the trip paths of vehicles entering Duvall from NE Woodinville-Duvall Road in the PM peak period.

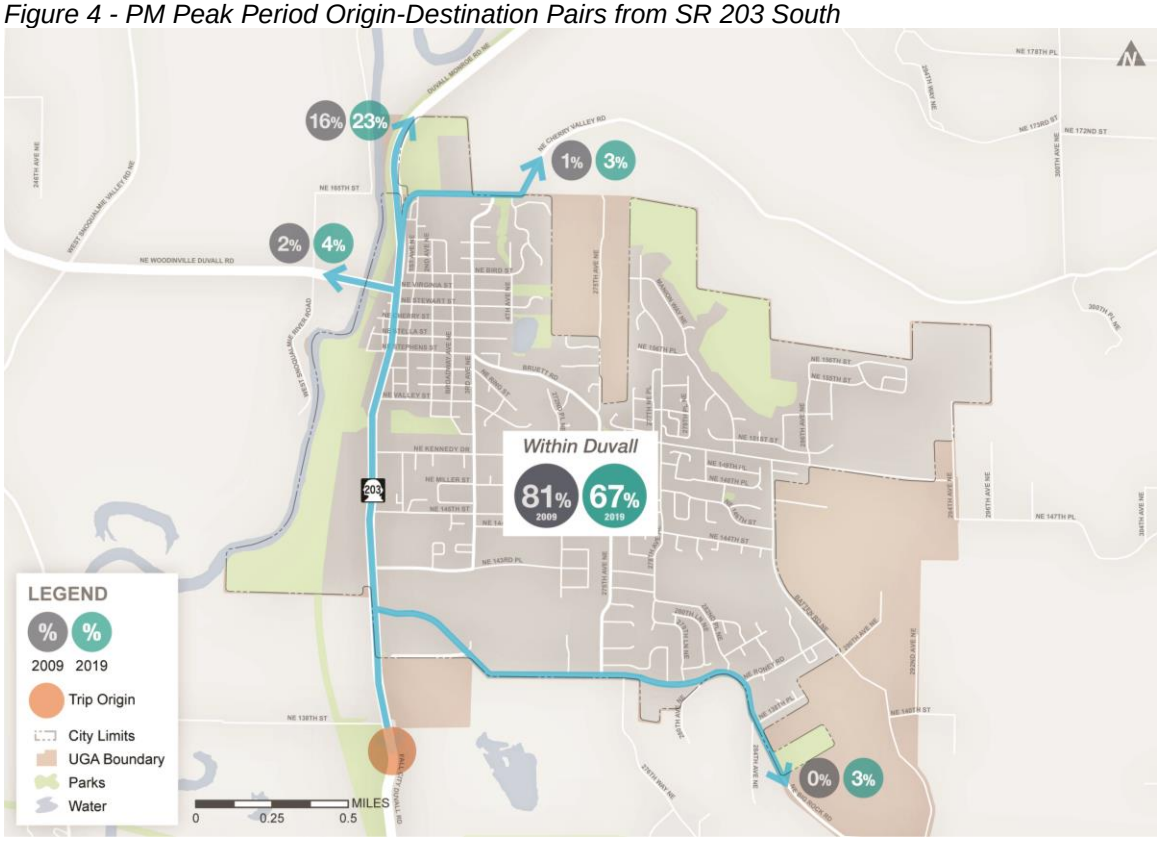
Figure 3 - PM Peak Period Origin-Destination Pairs from NE Woodinville-Duvall Road



Trip patterns have changed little between 2009 and 2019 for trips entering the study area from NE Woodinville-Duvall Road. The largest share of trips continues to be destined into Duvall (46 percent), followed by 38 percent traveling north onto SR 203.

Figure 4 shows the traffic patterns for vehicles entering the study area via SR 203 from the south.

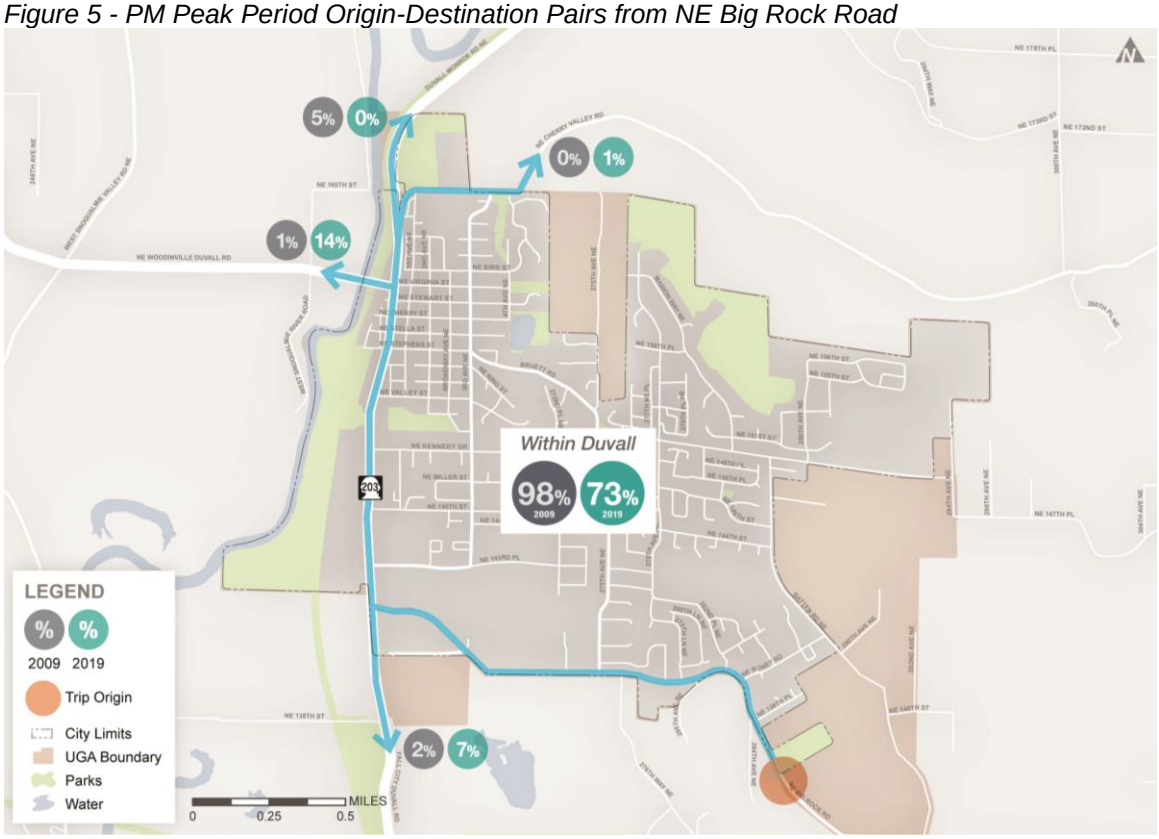
Figure 4 - PM Peak Period Origin-Destination Pairs from SR 203 South



Similar to results from 2009, the majority of vehicles entering the study area along SR 203 from the south are headed into the City of Duvall. 23 percent of trips continue through the study area to the north on SR 203, up slightly from 16 percent in 2009. Trips to other locations are each under 5 percent of the total.

Figure 5 shows trips entering the study area via NE Big Rock Road during the PM peak period.

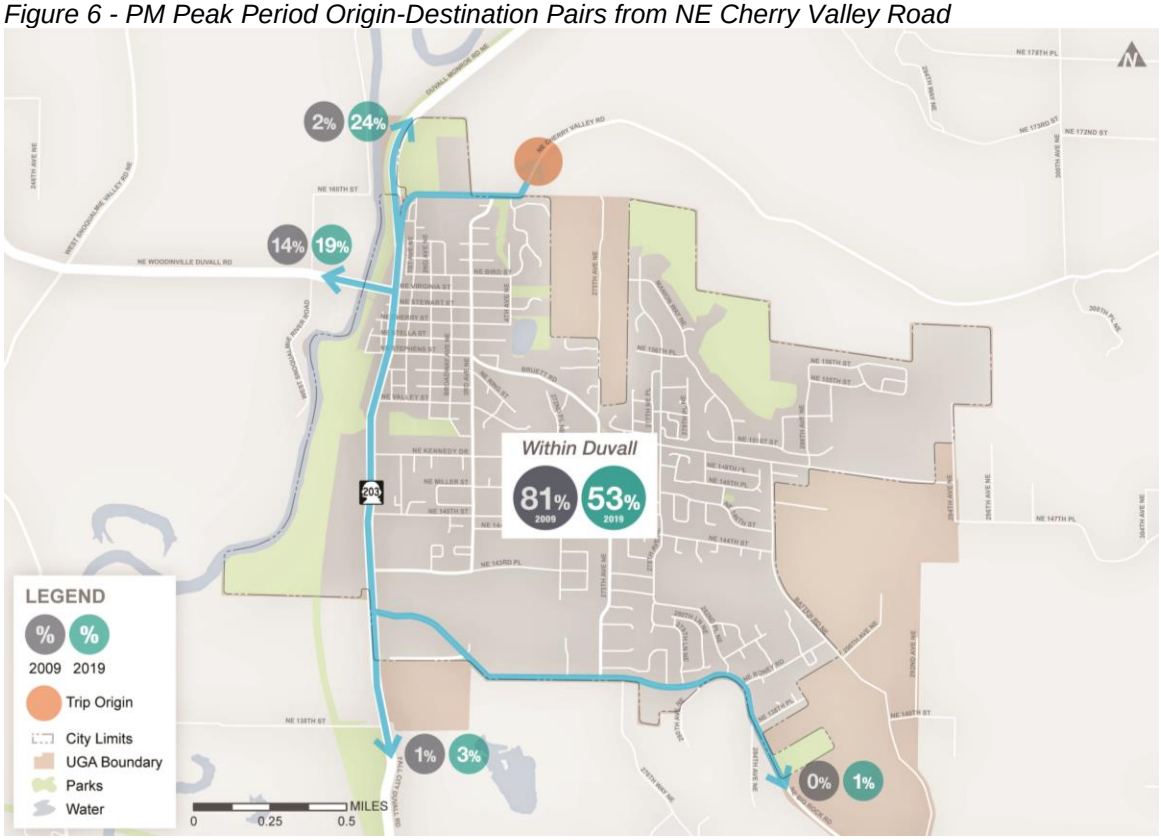
Figure 5 - PM Peak Period Origin-Destination Pairs from NE Big Rock Road



Trips patterns from NE Big Rock Road are similar in 2019 compared to 2009. The majority of trips are destined to the City of Duvall, with an increase in the number of trips traveling to NE Woodinville-Duvall Road and to SR 203 to the south.

Figure 6 highlights travel patterns from NE Cherry Valley Road during weekday PM peak period.

Figure 6 - PM Peak Period Origin-Destination Pairs from NE Cherry Valley Road



Trips entering the study area from NE Cherry Valley Road continue to primarily be destined for the City of Duvall. However, there was a large increase in traffic to the north (via SR 203) between 2009 and 2019. Traffic patterns to other locations in 2019 remained within 5 percent of results from 2009.

Summary

The purpose of this study was to better understand the traffic patterns of vehicles traveling to and coming from the City of Duvall. During typical commute periods, much of the traffic entering and exiting the study site from SR 203 and NE Woodinville Duvall Rd is not destined to the City of Duvall. However, during non-peak times, the majority of vehicles entering the study area is destined to the City of Duvall.

Comparing weekday PM peak period results from 2019 to 2009 shows that while the majority of trips entering the study area continue to be destined toward the City of Duvall, that percentage has increased in the last 10 years. In addition to percent changes, WSDOT ADT estimates along SR 203 (just north of NE Woodinville Duvall Road) show that in 2009 the estimated ADT was 9,700 and that number increased to 10,000 in 2018 (the most recent year of data available)[1]. Travel along SR 203 during the weekday PM peak period has shown the greatest increase in regional traffic (traffic that is not destined to the City of Duvall). This suggests that SR 203 is increasingly used for regional traffic during commute times.

[1] WSDOT Traffic ADT estimates from https://wsldocs.sos.wa.gov/library/docs/dot/annualtrafficrpt/annualtrafficrpt_home.aspx