

Port of Vancouver Truck Study

Anne Goodchild + Maura Rowell
University of Washington

16 August 2011

1 Introduction

The Port of Vancouver, located in Vancouver, WA along the Columbia River, is interested in gathering information on the travel patterns of port-generated trucks. The area of Vancouver located between the port and I-5 consists largely of small businesses with no large industrial centers. The behavior of the majority of port-generated trucks is, therefore, to travel directly from the port to I-5. The port is specifically interested in the route choice between Mill Plain Blvd., 4th Plain Blvd., and 39th Street. Mill Plain and 4th Plain were designated as the two primary port access ways in the 2004 Clark County Mobility Study. In order to determine the route split, data was gathered from multiple sources and synthesized, compared, and contrasted to form a representation of truck travel between the Port of Vancouver and I-5.

2 Data Sources

A combination of sources is used to form a picture of the truck travel patterns in Vancouver. Each data source has certain strengths and weaknesses; the sources are synthesized with the objective of utilizing the strengths of one source to compensate for another's weaknesses. The sources include port tenants' records, a UW-conducted truck count, a 3rd party truck count and data from Portal. Each source is detailed below.

2.1 Port Tenants' Records

The Port of Vancouver is host to a number of tenants who conduct business in and around the port. Seventeen tenants were designated as truck-generators by the port. This list of tenants was contacted by the University of Washington and each tenant was asked to provide historical data about its truck operations. Specifically, the data requested included the following information per truck trip: number of axles, engine year, time of departure from origin, load (load, less than load, or empty), type of cargo,

origin, destination, and route (4th Plain, Mill Plain, other, or don't know). The tenants were asked to fill in this information for each truck trip during the week of Monday, 28 March to Friday, 1 April 2011. This week was chosen arbitrarily such that it was sufficiently near to the collection dates of the other data sources and did not knowingly present any scheduling abnormalities. A given week was used so that each tenant would report information for the same time period and be subject to the same operating conditions.

The tenant data collected ranged in both completeness and granularity. Tenants were made aware by the port that the UW would be contacting them within the week. The first attempt by the UW to contact the tenants was via email and included a letter explaining the data collection goals and an MS Excel spreadsheet template for data input. The second and third attempts were via phone and successful efforts resulted in tenants emailing a spreadsheet of their company's truck trips. Many tenants reported they knew only an 'average weekly volume' and did not itemize travel into distinct trips. Seven of the 17 tenants broke down their trips by day of the week and six of those seven also reported time of day. Those that gave averages reported that they did not keep detailed enough records in order to itemize the trips by time of day or they did not have direct management of the trucks.

The tenant data collected offers limited origin/destination (O/D) data. This O/D data, therefore, is used simply to validate that trucks are largely traversing Vancouver and making no deliveries between the port and Interstate-5. The value of the tenant data is derived from the reported number of truck trips. The reported number of trips offers a lower bound to the numbers gathered in the UW-conducted truck count (a lower bound because not all trips were reported). The breakdown of trucks by axle will also be compared to the breakdown reported in the 3rd-party count to determine if there are significant differences in the fleet characteristics of port-generated trucks versus the truck fleet at large in Vancouver.

Weaknesses of tenant-reported data, and the collection thereof, include

- Varying levels of record keeping across the different tenants,
- Inconsistent record keeping within one company (departmentally, temporally, etc.),
- Lack of interest on behalf of the tenants,
- Tenant privacy concerns, and
- Tenants do not know and/or record the route taken by drivers.

Tenant-reported data cannot, therefore, be used as the only source of truck travel information, but it can be used to obtain volumes and truck trips versus time of day.

2.2 UW-Conducted Truck Count

The UW-conducted truck count took place in Vancouver during the business week of 13-17 June 2011. The primary goal of the truck count was to determine the percentage of port-generated trucks that use

Mill Plain Blvd. and 4th Plain Blvd. to traverse downtown Vancouver. An underlying assumption of the count is that trucks prefer to use Mill Plain Blvd. and 4th Plain Blvd. to travel between the Port of Vancouver and I-5. This prior information was generated through observation by Port of Vancouver officials. Therefore, the counts take place along Mill Plain Blvd., 4th Plain Blvd., and 39th Street. Each day, Monday through Friday, truck counts were conducted between 7:30 - 11:30 AM and 12:30 - 4:30 PM and were broken down into 15 minute intervals. The time for the count was chosen to align with the port's operating hours. A total of 13 counters were stationed at six locations throughout Vancouver between the Port of Vancouver and I-5. The locations were (as seen in Figure 1):

1. the main gate of the Port of Vancouver,
2. the split of Lower River Road into Mill Plain and 4th Plain,
3. Kotobuki Way off of 4th Plain,
4. W 39th Street and Fruit Valley Road,
5. 4th Plain and Columbia Street, and
6. Mill Plain and Columbia Street.

At station 1, the counters recorded whether the trucks entered or exited the Port of Vancouver's main gate. At station 2, the counters recorded whether port-exiting trucks continued on Mill Plain or 4th Plain and whether port-entering trucks came from Mill Plain or 4th Plain. The difference in the amount of port-exiting trucks recorded at stations 1 and 2 is the amount of trucks headed east on Lower River Road that did not exit the Port of Vancouver. These trucks may have originated from the tenant locations near the Port administrative offices or Gateway Avenue. This difference can also be used for trucks headed west as well. The difference between trucks recorded first at station 2 and then port-entering trucks recorded at station 1 will generate the number of trucks using Lower River Road that did not enter the port.

At station 3, the counters recorded whether trucks continued on 4th Plain or turned north onto Fruit Valley Road. Prior to conducting the count, port officials hypothesized that some trucks avoided both Mill Plain and 4th Plain and instead took Fruit Valley Road to W 39th Street. At station 4, counters recorded whether north-bound trucks continued on Fruit Valley Rd or if they turned right onto W 39th Street. Station 4 counters also recorded whether south-bound trucks originated from Fruit Valley Rd or if they turned left from W 39th St. onto Fruit Valley Road.

Counters at stations 5 and 6 recorded the number of trucks using Mill Plain and 4th Plain. The numbers recorded at these stations are compared to the numbers recorded to the west to determine if trucks that were initially on either Mill Plain or 4th Plain diverted from these roads later on.

Synthesizing the numbers recorded at all six stations will generate the flow of port-generated trucks through the street network of Vancouver, WA. For more detail, refer to the "Vancouver, WA Port Truck Count Summary" memo dated 17 June 2011.

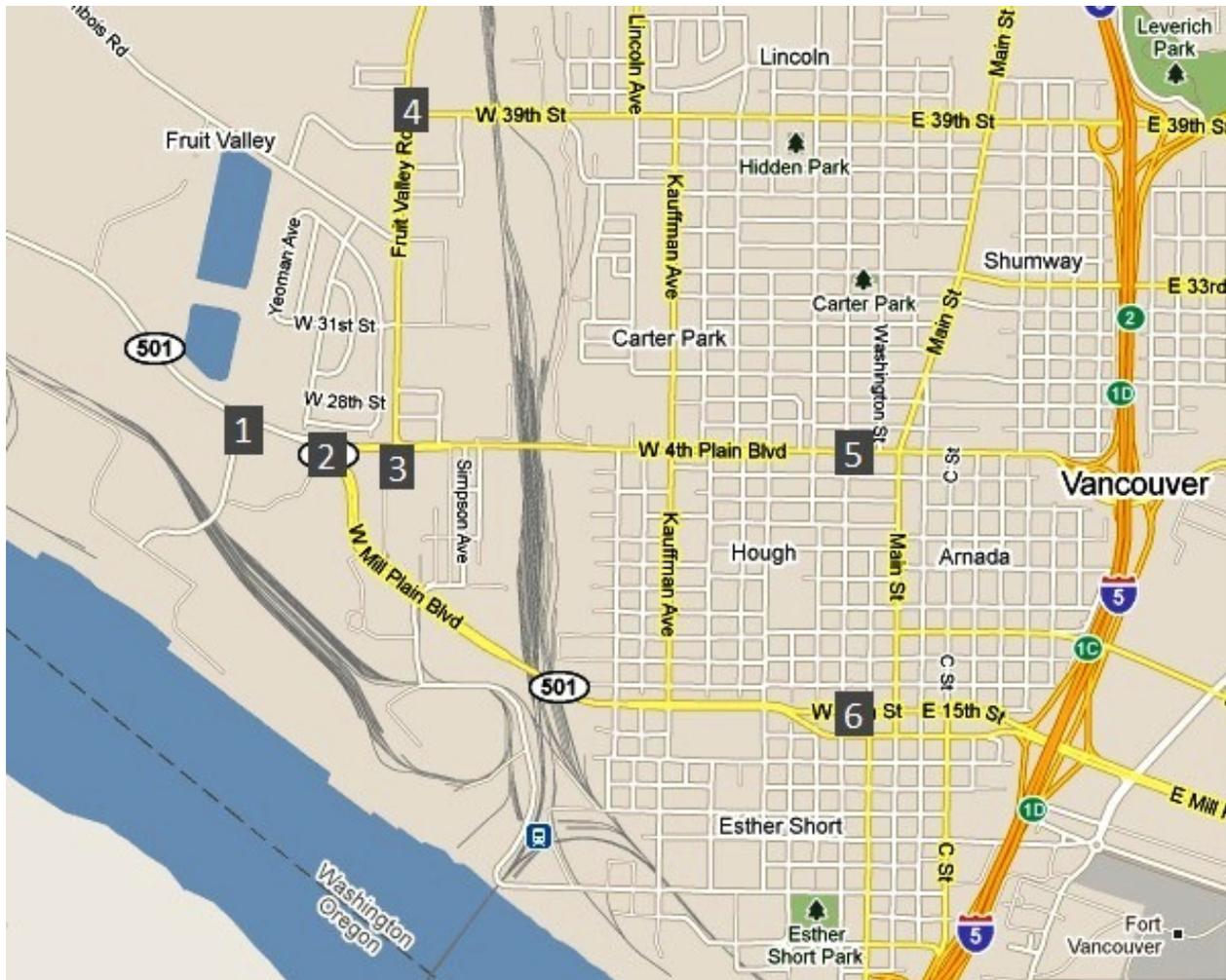


Figure 1 Count Location Map The gray boxes labeled 1-6 mark the locations where the UW counts took place 13-17 June 2011. *Source: Google Maps 2011.*

2.2.1 Potential Issues

There are several issues that could affect the validity of the truck count. These issues include:

- missing data due to counter absences,
- unusual traffic patterns by lost truck drivers,
- the short time frame during which the count was conducted, and
- possible differences in the classification of trucks as 'port-generated' by counters.

Differences in classification of trucks by counters will increase or decrease the number of trucks recorded at different stations. Prior to beginning the count, the counters were instructed to not count delivery trucks (e.g., UPS and FedEx), utility trucks, and small commercial vehicles. The counters were also

given photographs of a portion of the tenants' trucks to increase their knowledge of port-generated trucks.

There were unexpected events that prevented some counters from working their shifts. These absences included (1) a counter having an unexpected job interview and (2) a counter's car being broken into and having her belongings stolen. Having two counters at each station counteracted these absences. Counters mentioned seeing the same truck multiple times in a short period of time. This may be due to lost truck drivers and may artificially inflate the truck counts at some stations, specifically station 2.

Activity at ports is highly seasonal, both in general and with respect to certain cargo. For instance, wind parts are moved at the Port of Vancouver for only a limited amount of the year. This truck count occurred during a period when wind parts were being shipped, and therefore, the truck count will be higher than during the average week. The amount of truck activity is also dependent on whether vessels are calling at the port.

2.3 3rd Party Truck Count

The Southwest Washington Regional Transportation Council (RTC) is the Metropolitan Planning Organization responsible for Vancouver, WA. The RTC conducted a count in Vancouver during a time frame close to the UW-conducted count. The RTC count gathered data from the west side of I-5 at:

- A. Mill Plain Blvd.,
- B. Fourth Plain Blvd.,
- C. 39th Street,
- D. 78th Street and
- E. 99th Street

during May and June 2011 (A - C shown in Figure 2). The count at each station was conducted on a given day for 24 hours and includes classification data (motorcycles, cars/trailers, and 2 to greater than 6 axles). The trucks counted in the RTC effort include both port-generated and general truck traffic. The number of trucks in general from the RTC count will be compared to the number of port-generated trucks from the UW count.

2.4 Portal Data

Portal is a transportation database for the Portland-Vancouver metropolitan region. The system is being developed and maintained by students and faculty at Portland State University's Intelligent

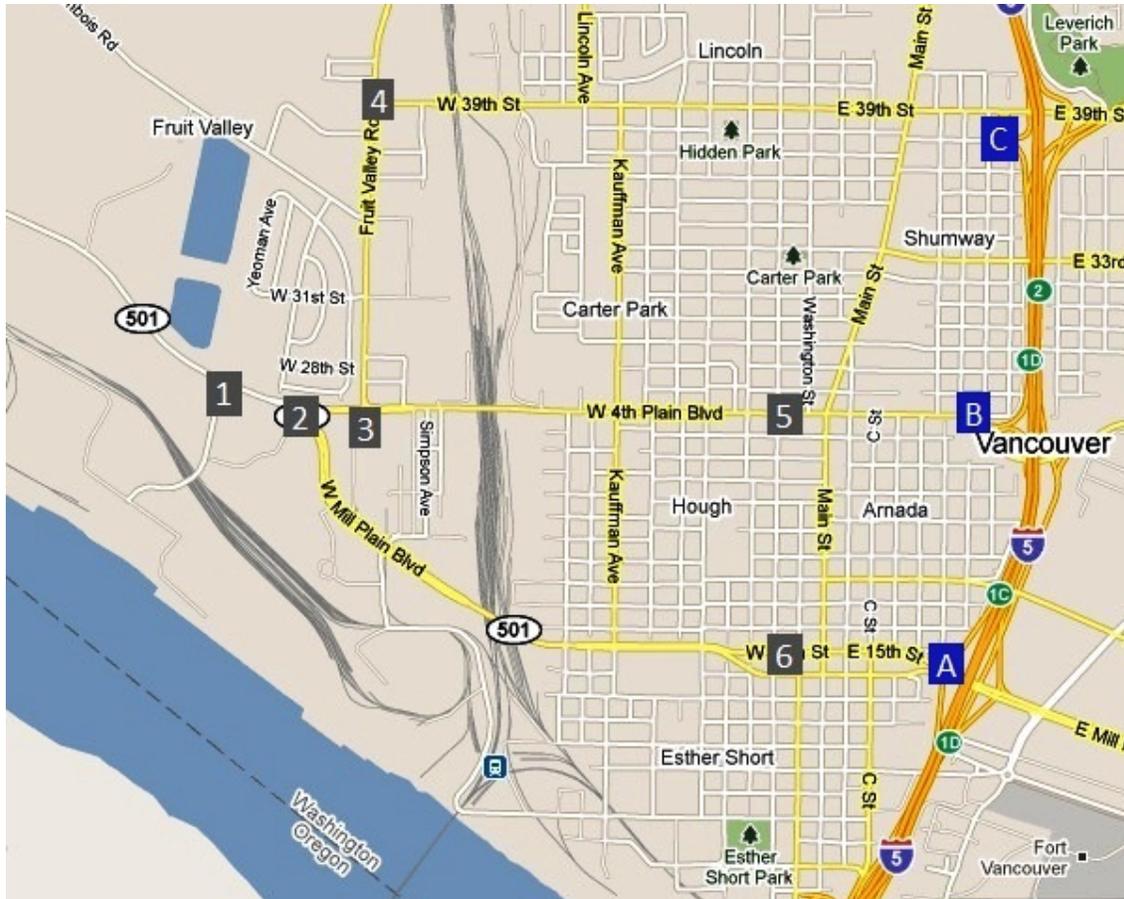


Figure 2 3rd Party Count Location Map The markers A through C mark the location of the RTC data collection stations parallel to I-5. *Source: Google Maps 2011.*

Transportation Systems Laboratory in cooperation with the Oregon Department of Transportation, Metro, the City of Portland, TriMet, the Southwest Washington Regional Transportation Council and other regional partners. Portal data includes local traffic speeds, volumes, incidents, and weather dating back to 2004. The information can be displayed for 10 different highways in either 5, 15, or 60 minute intervals. The data obtained from Portal includes volumes of total traffic at four stations along I-5 in both southbound and northbound directions for week of 13-17 June 2011 (Figure 3). The stations are I-5 at:

- Evergreen,
- 29th Street,
- Kiggins, and
- Main St.

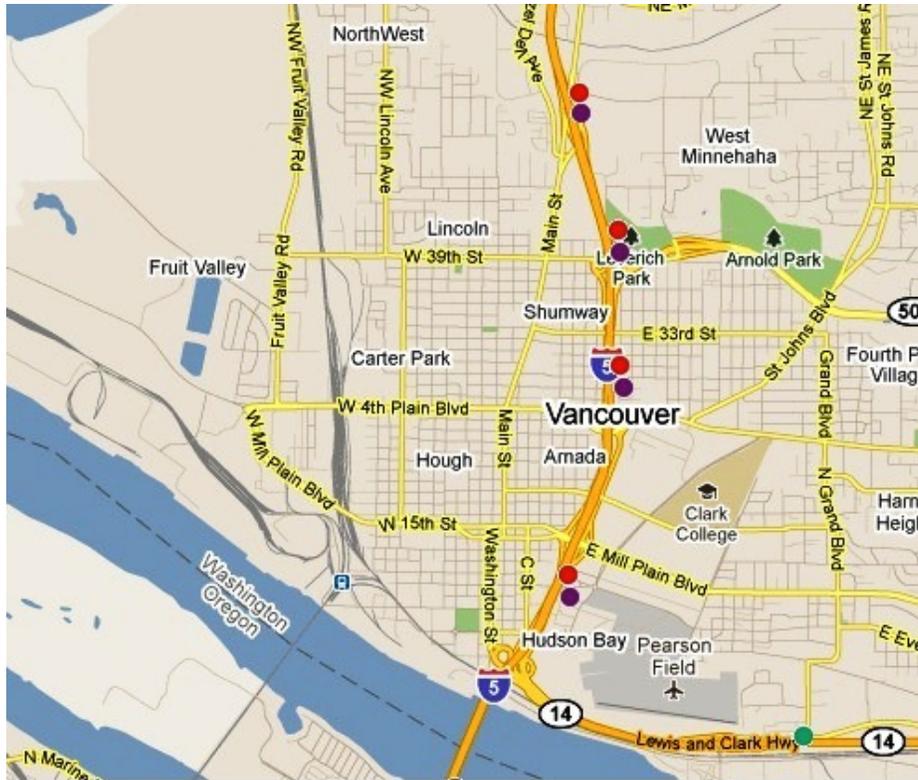


Figure 3 Portal Data Collection Station Map The red and purple (north- and southbound) dots on the map mark the location of the portal data collection stations along I-5. *Source: Portal.*

The usefulness of Portal data is, due to its archival nature, the ability to retrieve data from the dates that correspond to the other data collection efforts. The Portal data does not include classification data and therefore cannot be used to determine volume of trucks; it can however be used for general traffic counts.

3 Data Analysis + Results

3.1 Truck Flow through Vancouver

The UW-conducted count data is used to determine the route split of port-generated trucks between the Port of Vancouver and I-5 (the raw counts are included in Appendix A). The flow of trucks heading west and east are shown in Figure 4 and 5 below. The nodes are the stations at which the counters were located. The links (Y_i and X_i) are the roads the majority of the trucks were assumed to be using. Using network analysis the percentage of trucks using Fruit Valley N, 39th St., 4th Plain Blvd, and Mill Plain Blvd can be determined. The number of port-generated trucks seen at the Lower River Split is lower than the numbers seen at stations farther east. The data analysis will use the larger numbers seen farther west with the assumption that the percentages (not the absolute value) of trucks using each link is similar for both port-generated trucks and general trucks. The UW-conducted count sees larger numbers of trucks at the 39th and Fruit Valley; 4th Plain and Columbia; and Mill Plain and Columbia

stations than at the main gate. The increase in trucks can be due to port-generated trucks leaving from other areas such as the tenant's offices/warehouses. From Figure 10 and 11 it is clear that the route split for port-generated trucks just west of I-5 is similar for port-generated trucks immediately before entering the port. The figures (Figure 6-11) below show the split of trucks at the junction of Mill Plain Blvd. and 4th Plain Blvd. at Lower River Road.

The flows can be determined by time of day and day of week to show temporal variations in route choice. The route choice of port-generated trucks varies throughout the day as shown in Figure 5. Mill Plain is the primary choice for trucks heading west. The percentage of trucks using Mill Plain declines slightly throughout the day and then rises again in the late afternoon. The percentage of trucks using 4th Plain and Fruit Valley is similar in the morning with 4th Plain being the preferred choice in the afternoon. Figures 5 and 6 show the route split for Monday. The other days, Tuesday - Friday show similar results. Mill Plain is also the primary choice for trucks heading east. The percentage of east-bound trucks using E 39th Street and Fruit Valley(northbound) remains relatively constant throughout the day with the percentage being slightly higher on Fruit Valley north of 39th. The percentage of trucks using 4th Plain increases throughout the day with a peak around 2:00 - 3:00 PM.

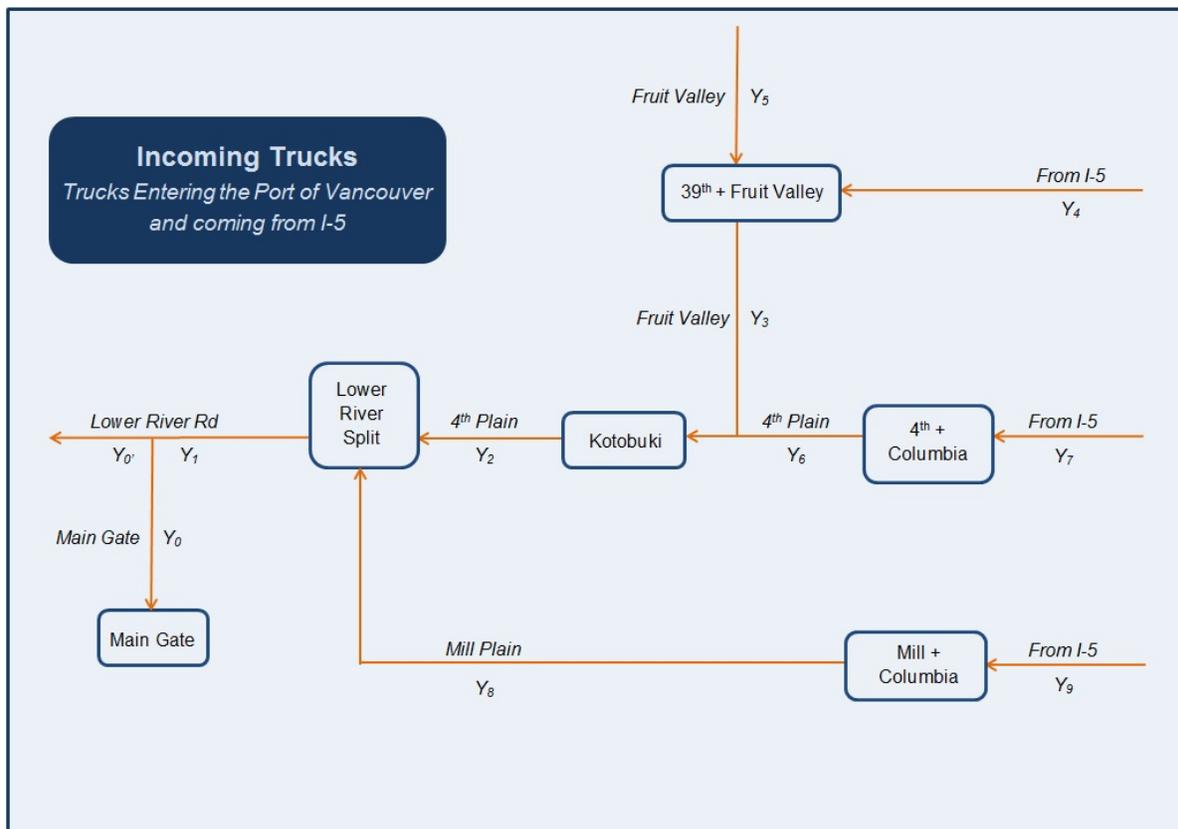


Figure 4 Incoming Trucks The figure shows the nodes (counting stations) and links (roads) trucks use to travel between I-5 and the Port of Vancouver.

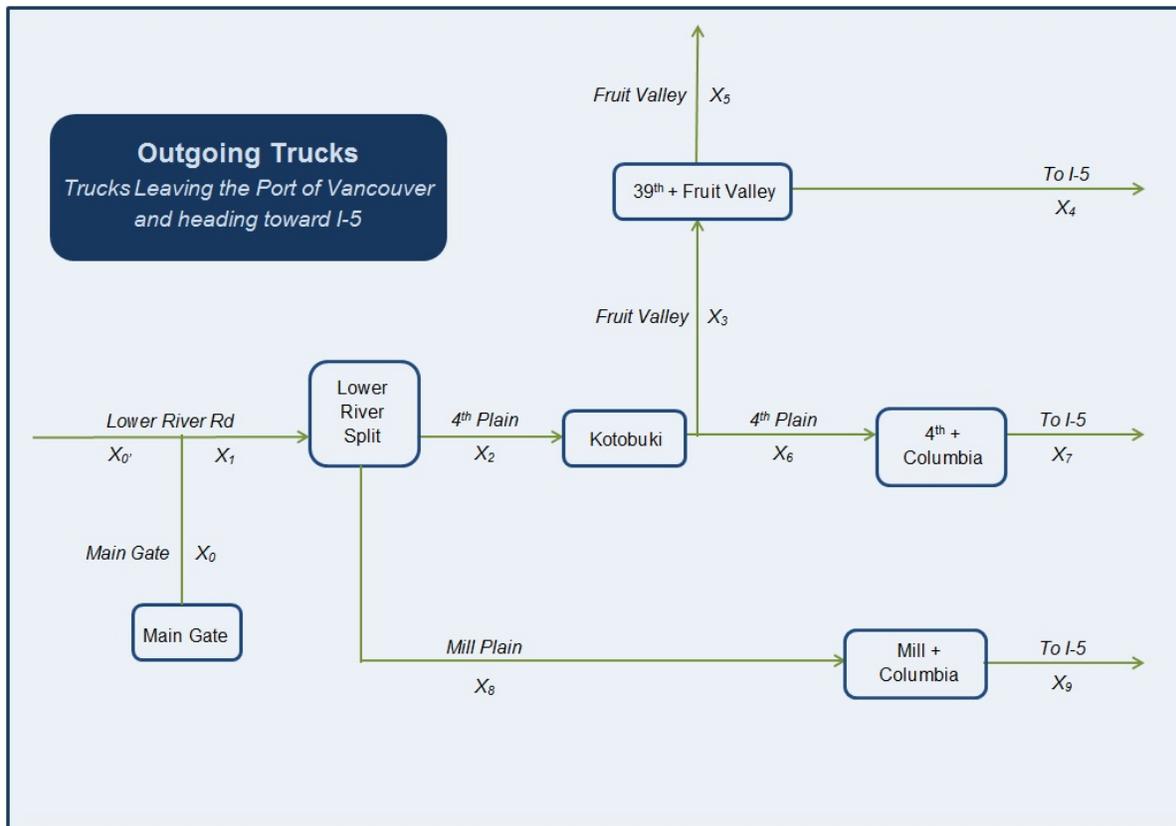


Figure 5 Outgoing Trucks The figure shows the nodes (counting stations) and links (roads) trucks use to travel between I-5 and the Port of Vancouver.

In Figures 3 and 4 the following equations apply:
In the westbound direction:

1. $x_{0'} + x_0 = x_1$
2. $x_1 = x_2 + x_8$
3. $x_1 = x_4 + x_7 + x_9 + x_5$
4. $x_2 = x_3 + x_6$
5. $x_3 = x_4 + x_5$

and in the eastbound direction:

1. $y_{0'} + y_0 = y_1$
2. $y_1 = y_2 + y_8$
3. $y_1 = y_4 + y_7 + y_9 + y_5$

4. $y_2 = y_3 + y_6$

5. $y_3 = y_4 + y_5$

There are differences between the two data sets. Keep in mind that the data included in the RTC charts are not all from the same day and includes non-port-generated data. All charts show that 39th is the least used route and eastbound traffic prefers Mill Plain. The RTC split data shows that Mill Plain Blvd. and 4th Plain Blvd. are equally preferred by the general truck population heading west. The key takeaways from these figures are:

- Port-generated trucks prefer Mill Plain Blvd., 4th Plain Blvd., and 39th St in that order and in both east and west directions.
- Port-generated trucks tend to switch from Mill Plain Blvd. to 4th Plain Blvd. as the day continues.
- The general truck population maintains a more constant route split throughout the day.
- The general truck population utilizes 39th St to a greater extent than port-generated trucks.
- The general truck population uses Mill Plain Blvd. and 4th Plain Blvd. equally in the westbound direction while Mill Plain Blvd. is preferred in the eastbound direction.

The truck population used to generate the port-generated truck route split was observed in the UW count, while the truck population used to generate the general truck route split was observed in the RTC data. The general truck population is larger than and includes the port-generated population. The general truck population may behave differently than the port-generated trucks in the following ways:

- general trucks may be using a certain route for convenience while making deliveries,
- general trucks may not be traveling to I-5 or to the Port of Vancouver, and
- general trucks include delivery, garbage, recycling, and construction trucks which make many short trips in a local area while port-generated trucks make fewer longer distance trips.

The route splits observed in the figures below is similar to the route split reported in the 2008 Port of Vancouver Freight Corridor Travel Time Study which are as follows: 49% use Mill Plain, 48% use 4th Plain, and 3% use 39th St. The more recent split shows some movement from 4th Plain to 39th St.

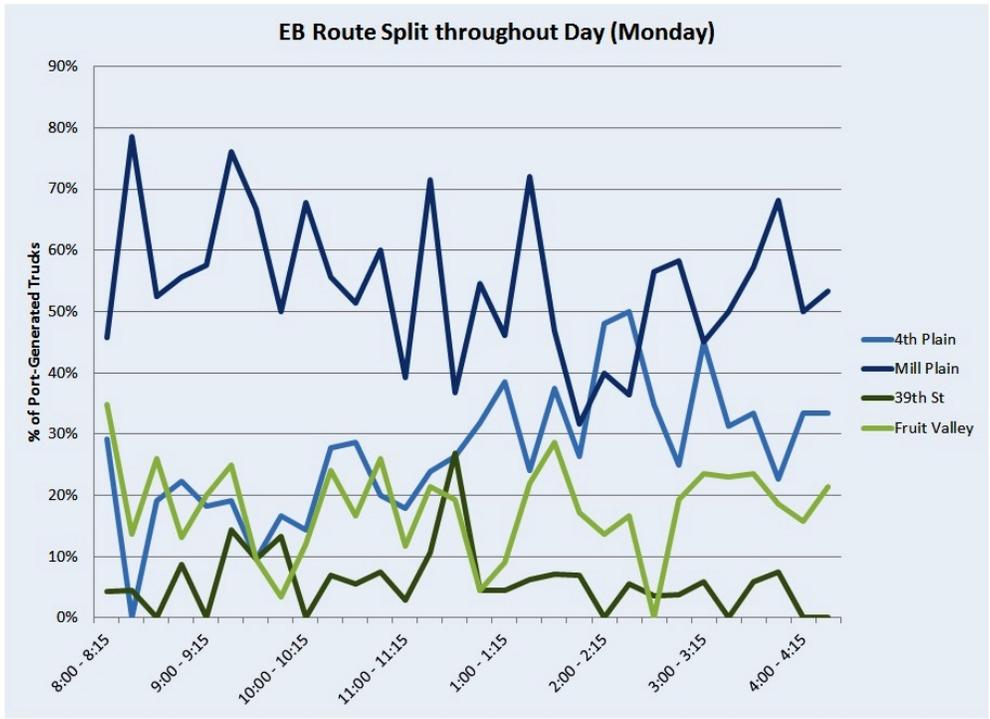


Figure 6 EB Route Split The graph shows the Mill Plain is the first choice and 4th Plain is the second choice.

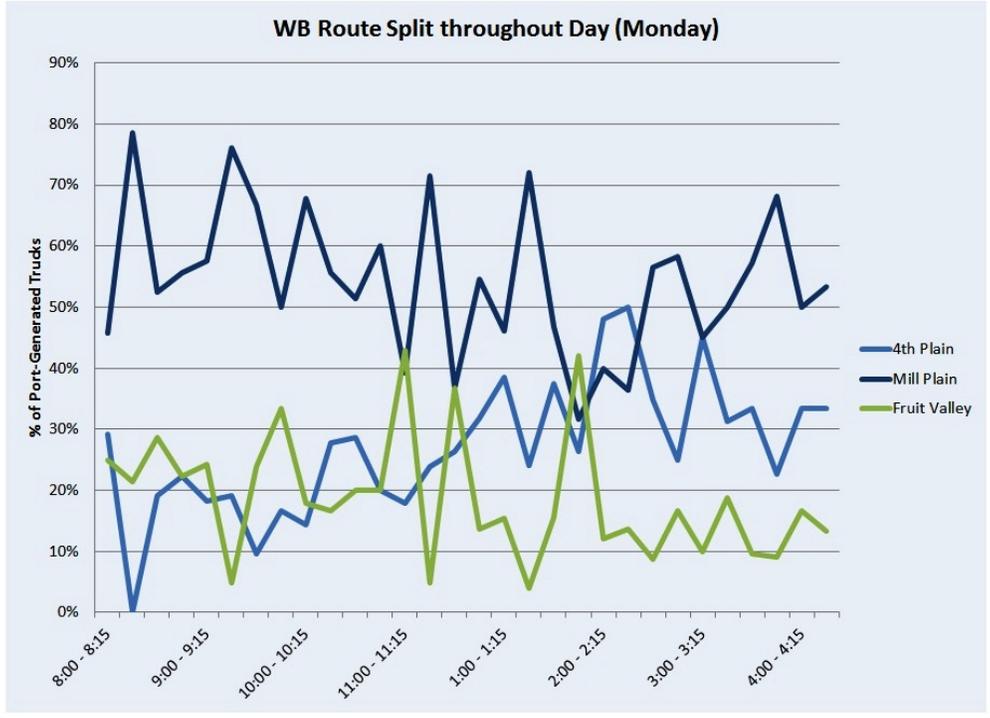


Figure 7 WB Route Split The graph shows the Mill Plain is again the first choice and 4th Plain is the second choice.

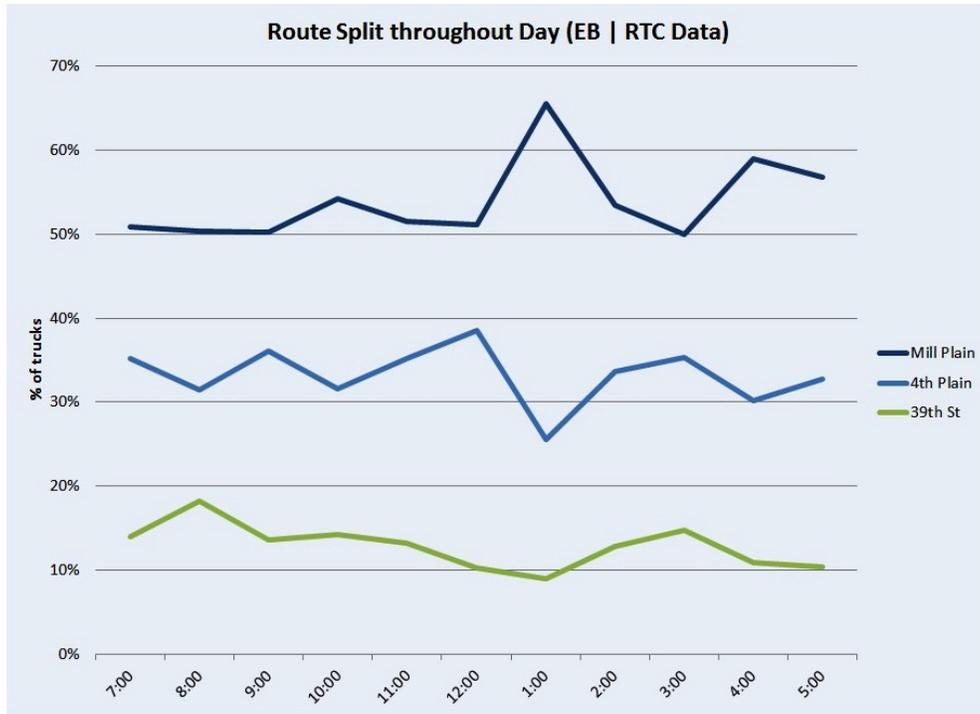


Figure 8 EB RTC Route Split The graph shows the Mill Plain is the first choice, 4th Plain is the second choice, and 39th is third choice.

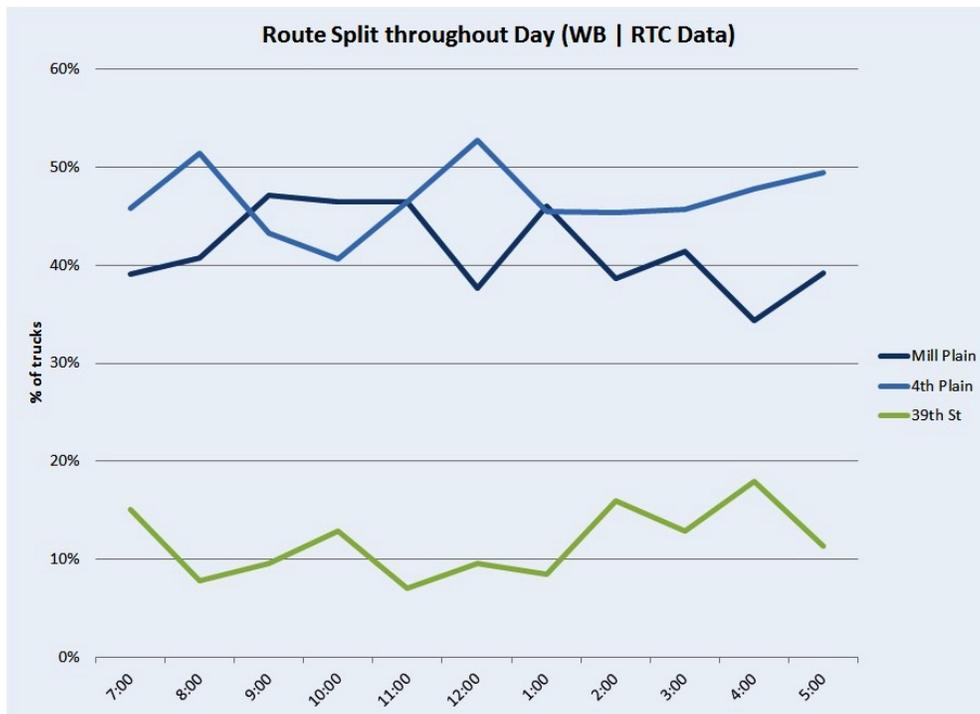


Figure 9 WB RTC Route Split The graph shows the Mill Plain and 4th Plain compete for first.

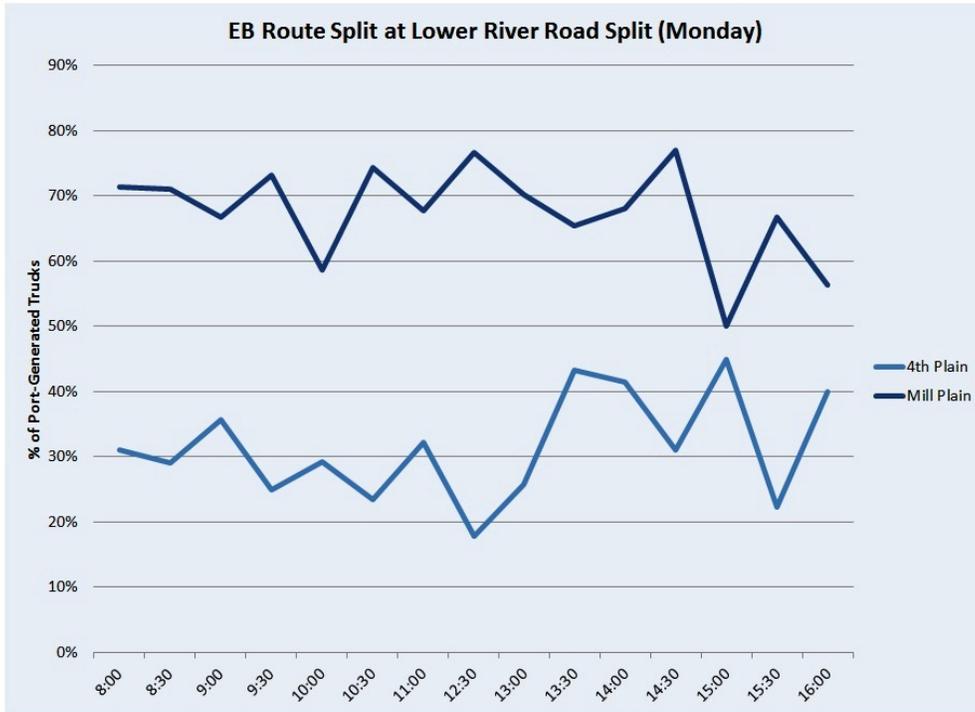


Figure 10 EB Lower River Road Route Split The graph shows the Mill Plain is the first choice and 4th Plain is the second choice.

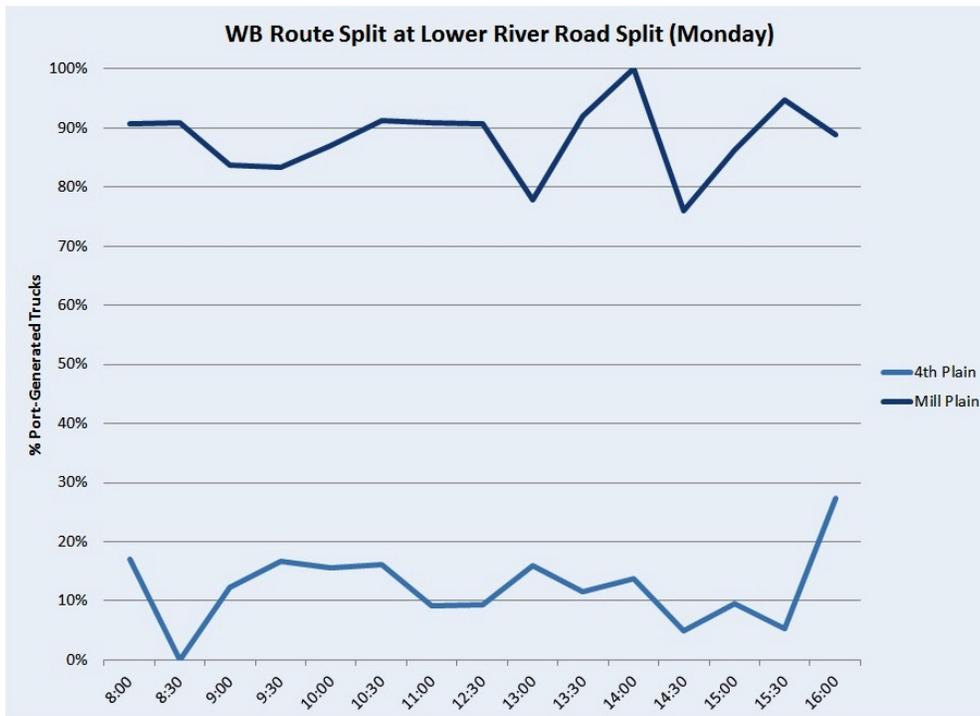


Figure 11 WB Lower River Road Route Split The graph shows the Mill Plain is the first choice and 4th Plain is the second choice.

3.2 Volume of Trucks Compared to General Traffic

The volume of trucks and the ratio of trucks to general traffic can be determined from the RTC count. These volumes can then be compared to the ratio of port-generated trucks obtained from the UW count to the Portal volumes of all traffic exiting/entering I-5. The data shown in Figures 12 and 13 below compares the percentage of trucks in total traffic just west of I-5 at Mill Plain Blvd, 4th Plain Blvd., and 39th street. This data is from the RTC count and was collected on the following days:

- Mill Plain Blvd.: 12 May 2011 (EB); 21 June 2011 (WB)
- 4th Plain Blvd.: 7 June 2011
- 39th Street: 7 June 2011

The westbound figure (Figure 13) shows that 4th Plain Blvd. has the highest truck density throughout the day while Mill Plain Blvd. and 39th Street experience similar truck densities. The maximum percentage is 14% on 4th Plain Blvd. at 8:00 AM. The eastbound figure (Figure 12) shows that Mill Plain Blvd. and 4th Plain Blvd. experience similar truck-to-traffic ratios which are higher than that seen on 39th Street. The maximum percentage is 13%, seen on Mill Plain Blvd. at 8:00 AM. In both directions the percentage of trucks on the roads decrease throughout the day and 39th Street maintains the lowest percentage. These numbers show that the majority of truck activity takes place in the morning. The port-generated truck counts can also be compared to the Portal data for total vehicular traffic. The same percentages and decline throughout the day is observed when comparing these data sets.

The percentage of port-generated trucks in the general truck population averages around 30 to 40%. It is lower in the morning suggesting that while there are high levels of port activity in the morning there is even higher levels of activity in the general truck population. The percentage is also higher on Mill Plain than the other preferred roads. These estimates must be viewed with caution for:

- The percentages were generated from the UW-conducted truck count and the RTC truck count which were conducted on different days. Therefore, the percentages may be affected by:
 - whether a ship was in port on one day and not the other,
 - weather differences, and/or
 - construction, accidents, or other non-recurring delays.
- The percentages for 39th St and Fruit Valley Rd in the westbound direction include UW-conducted count data from 39th St and Fruit Valley Rd combined and RTC data from 39th St and 78th St NE combined.

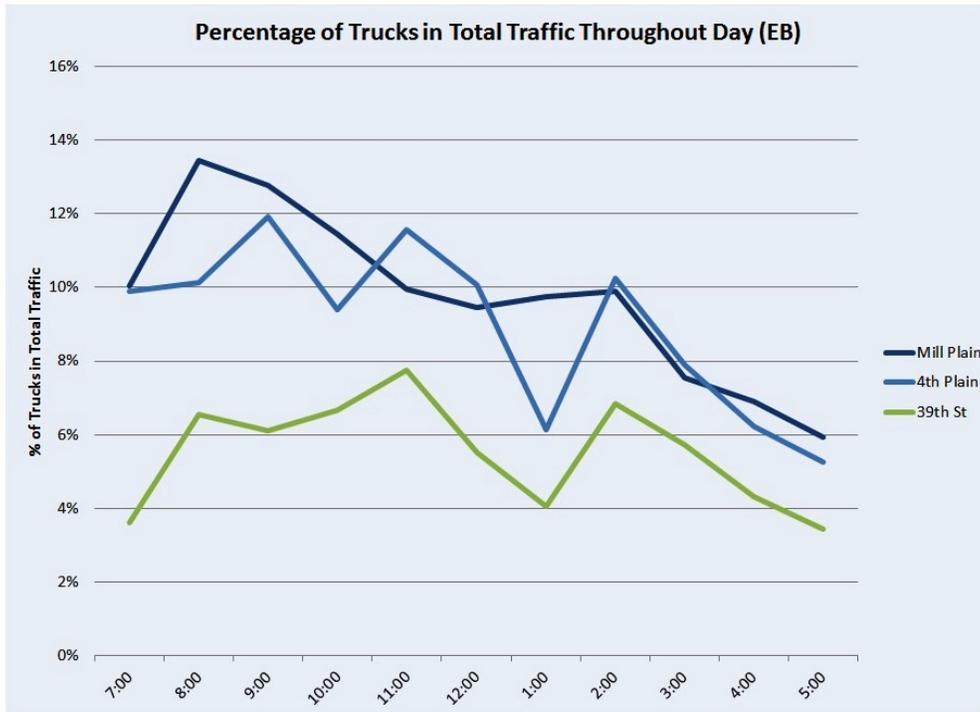


Figure 12 EB Percentage of Trucks to Total Traffic The figure shows that the percentage of trucks in the total traffic decreases throughout the day.

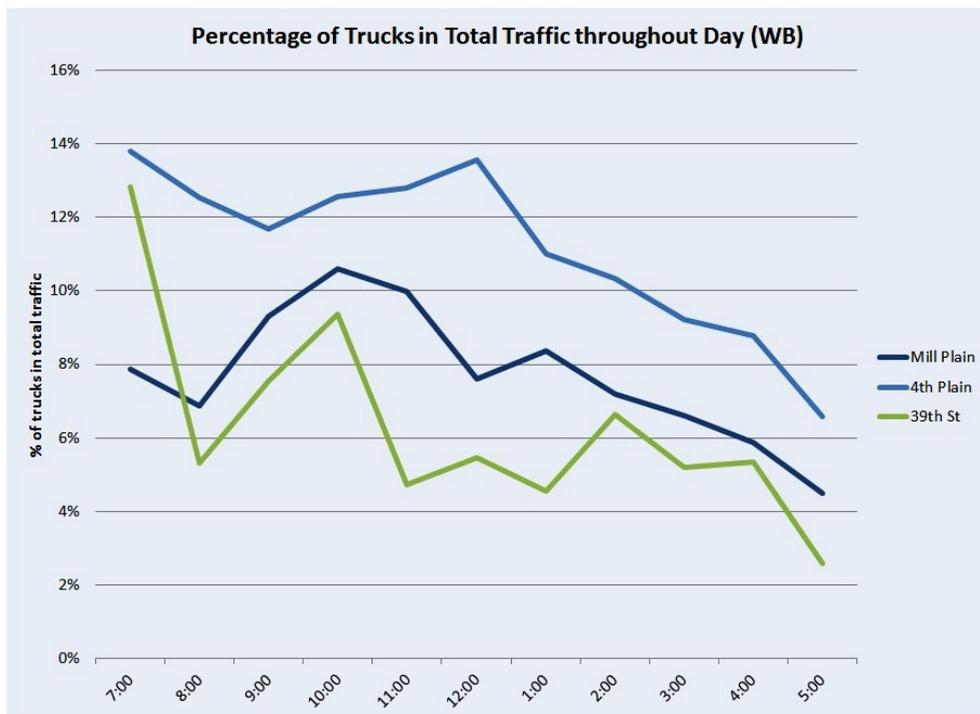


Figure 13 WB Percentage of Trucks to Total Traffic The figure shows that the percentage of trucks in the total traffic decreases throughout the day.

Time	Eastbound			Westbound		
	Mill	4th	39th +Fruit Valley	Mill	4th	39th +Fruit Valley
8:00	44%	9%	12%	37%	14%	14%
9:00	46%	25%	32%	41%	16%	15%
10:00	47%	22%	21%	39%	22%	10%
1:00	36%	44%	35%	40%	31%	23%
2:00	35%	30%	11%	42%	33%	17%
3:00	32%	19%	14%	43%	29%	25%

Figure 14 Percentage of Port-Generated Trucks in General Truck Population

The table below lists the arrival and departure dates and times of ships at the Port of Vancouver. The days of data collection (May 12 and June 7,13-17, 21) all correspond to a ship calling at the port. The cargo being loaded/unloaded, however, varies across the days. The UW-count saw a high number of windmill parts being moved, and this corresponds with the dates windmill parts were being unloaded at the port.

Date of Arrival	Time of Arrival	Date of Departure	Time of Departure	Cargo
7-Jun-11	8:30	7-Jun-11	11:30	Autos
13-Jun-11	5:18	15-Jun-11	17:08	Windmills + Project
13-Jun-11	11:08	16-Jun-11	6:45	Windmills
14-Jun-11	17:40	17-Jun-11	6:07	Grain
17-Jun-11	7:05	18-Jun-11	5:50	Project
21-Jun-11	16:05	21-Jun-11	16:33	Liquid Bulk
21-Jun-11	7:20	23-Jun-11	6:20	Grain

Figure 15 Vessel Calls at the Port of Vancouver The table below shows that there was a vessel calling at the port for a majority of the days on which data collection took place, but the nature of the cargo varied over the days.

The truck percentages were compared to those of Los Angeles in three different locations. The tables show the percentages in different areas including:

- **Phase I** (October 1999) Central City East and the Port of Los Angeles, linked by the Alameda Corridor
- **Phase II** (February 2002) Northeast Los Angeles and the San Fernando Valley
- **Phase III** (January 2006) Hollywood, Mid-City, South Los Angeles, West Los Angeles, LAX, and the Port of Los Angeles

The percentages are similar to those observed in Vancouver, WA especially those percentages calculated for areas near the Port of LA/Long Beach.

Phase I	
Street	Percentage of Trucks During Peak Hours
Santa Fe (Between Washington and 7th)	15%
Olympic (Between Soto and Santa Fe)	13%
Central (Between Washington and Olympic)	9%

Figure 16 Phase I Truck PercentageSource: *The City of Los Angeles Transportation Profile. (2009).* Retrieved, 2011, from <http://ladot.lacity.org/pdf/PDF10.pdf>

Phase II	
Street	Percentage of Trucks During Peak Hours
Nordhoff (Between Balboa and Reseda)	3%
De Soto (Between Roscoe and the 118 Freeway)	4%
Sepulveda (Between Roscoe and Sherman)	4%

Figure 17 Phase II Truck PercentageSource: *The City of Los Angeles Transportation Profile. (2009).* Retrieved, 2011, from <http://ladot.lacity.org/pdf/PDF10.pdf>

Phase III	
Street	Percentage of Trucks During Peak Hours
Century (Between Jefferson and Airport)	11%
Imperial (Between Aviation and La Cienega)	7%
La Cienega (Between Imperial and Century)	8%

Figure 18 Phase III Truck PercentageSource: *The City of Los Angeles Transportation Profile. (2009).* Retrieved, 2011, from <http://ladot.lacity.org/pdf/PDF10.pdf>

3.3 Port-Truck Volumes

Tenant-reported volumes and the UW-conducted count are used to portray the port-truck volumes in Vancouver. The volumes reported by the tenants show a morning peak that is consistent with the other data sources. The volumes reported by time of day (from the six tenants who gather such information) provide a lower bound to the volumes expected in the UW-conducted count. Looking at Figure 17 you can see that indeed the UW-conducted count numbers are higher than those reported by the tenants. The six tenants who reported trips by time of day make up only a portion of the total tenants so the lower numbers in the tenant-reported data are expected. The large spike at 8:00 AM is due to trucks leaving for their destination in the morning and not returning until the evening or the next day. Also early morning truck activity may be clumped together and reported as taking place at the opening of the business day, 8:00 AM. The sample of tenants may also be biased with those tenants whose truck activity is primarily in the morning peak.

Figure 19 show the cities that were reported by the tenants (the six who reported such information) to be origins or destinations of the port-trucks.

Cities of Origin and Destination				
Albany, OR	Clackamas, OR	Klamath Falls, OR	Pomeroy, WA	Tigard, OR
Aurora, CO	Clatskanie, OR	Lake Oswego, OR	Portland, OR	Tualatin, OR
Battle Ground, WA	Eugene, OR	Longview, WA	Salem, OR	Vancouver, WA
Beaverton, OR	Goshen, OR	McMinnville, OR	Salt Lake City, UT	Wallula, WA
Bend, OR	Gresham, OR	Milwaukie, OR	Sandy, OR	Warrenton, OR
Bonneville, WA	Hayward, CA	Mt. Vernon, WA	Seattle, WA	Wilsonville, OR
Boring, OR	Hillsboro, OR	Newberg, OR	Shelton, WA	Unknown
Canby, OR	Horse Butte, ID	Olympia, WA	Sherwood, OR	
Central Point, OR	Kelso, OR	Oregon City, OR	St Helens, OR	
Centralia, WA	Kennewick, WA	Pendleton, OR	The Dalles, OR	

Figure 19 O/D Cities The table lists the cities of origin and destination that were reported by the tenants.

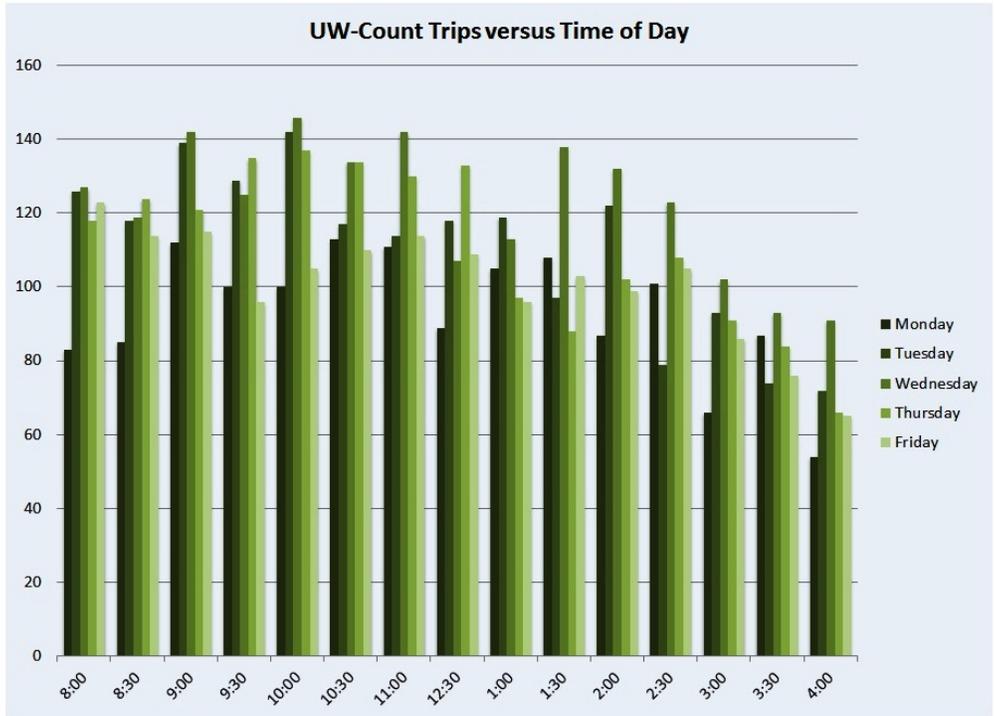


Figure 20 UW Count Trips Versus Day The graph shows high volumes in the morning and a slight tapering off in the afternoon. There is no data for 11:30-12:30.

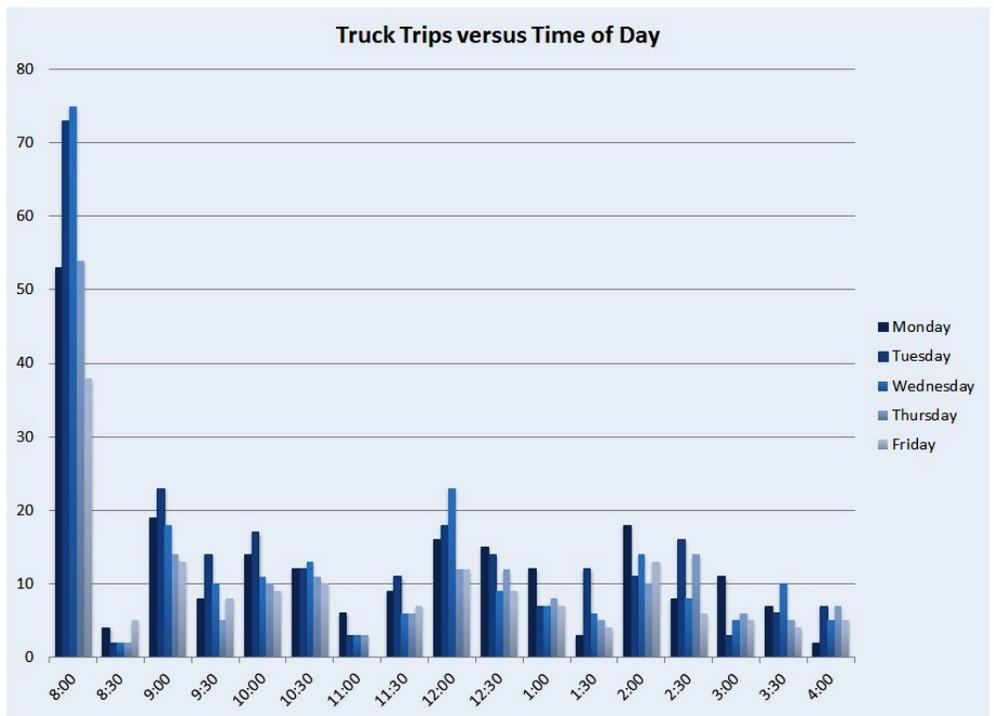


Figure 21 Tenant-Reported Trips Versus Day The graph shows high volumes in the morning and a tapering off in the afternoon.

4 Conclusions

The main conclusions are:

- Port-generated trucks prefer Mill Plain Blvd., 4th Plain Blvd., and 39th St in that order and in both east and west directions.
- Port-generated trucks tend to switch from Mill Plain Blvd. to 4th Plain Blvd. as the day continues until 2pm when trucks tend back toward Mill Plain for the evening rush hours.
- The general truck population maintains a more constant route split throughout the day.
- The general truck population utilizes 39th St to a greater extent than port-generated trucks.
- The general truck population uses Mill Plain Blvd. and 4th Plain Blvd. equally in the westbound direction while Mill Plain Blvd. is preferred in the eastbound direction.
- Both general trucks and port-generated trucks have high levels of activity in the morning and lower levels in the late afternoon.
- The percentage of trucks to general traffic remains below 14% and decreases throughout the day.
- The percentage of port-generated trucks in the general truck population ranges from 20 to 50%.

As a reminder, the route splits are depicted as percentages and not absolute values. So while the percentage of port-generated trucks decreases on Mill Plain Blvd. during the morning and early afternoon, the actual volume of trucks on Mill Plain might be increasing, static, or decreasing. The percentage of port-generated trucks using Mill Plain Blvd. and 4th Plain Blvd. converge during the morning hours. This trend is expected, since trucks will move from a heavily utilized road (Mill Plain Blvd.) to a less utilized road (4th Plain) in order to travel more quickly. After 2pm constraints and/or obstacles on 4th Plain Blvd. make Mill Plain Blvd. the preferred route. The 2009 Southwest Washington Regional Transportation Council Clark County Freight Mobility Study Draft Technical Report 3.B.3 reported that 4th Plain Blvd. presents geometric difficulties at the 1-5 interchange and also that the traffic signals on 4th Plain are not timed well for trucks. This may account for the transfer of traffic from 4th Plain to 39th St. and Mill Plain Blvd.

5 References

1. Portal (PSU). Portland, OR. Retrieved 7/15/2011, from <http://portal.its.pdx.edu/Portal/index.php/stations>.
2. Regional Transportation Council. RTC Truck Count. Vancouver, WA. <http://www.rtc.wa.gov/>