

Appendix A Freight Inventory

What are the existing freight operations on SR 167?

State Route 167 (SR 167) is a primary highway connecting south King and north Pierce counties to the Seattle/Bellevue metropolitan area. SR 167 serves the largest freight distribution center in the region and a growing number of housing developments. About one-third of the region's trucking storage facilities are located along the corridor. SR 167 is also considered an important alternative route to Interstate 5 (I-5) for moving both people and goods in the Puget Sound Region; however SR 167 is at capacity many hours of the day limiting its effectiveness as an alternative route.

To understand conditions on SR 167 for truck mobility, existing truck data were reviewed, characteristics of truck movement were summarized in a memo by Heffron Transportation, and truck accident data were analyzed. Key facts about existing truck movements on SR 167 are presented below. Information was also collected from truck-dependent businesses along the SR 167 corridor using a "Truck Freight Survey." A summary of the survey results are included with this technical memorandum. The final section of the technical memorandum summarizes the key truck mobility benefits of the potential bottleneck projects, developed to address the highest priority needs in the near-term for the SR 167 Corridor Plan.

Key findings from this truck mobility study for SR 167 are summarized below. More detailed information is presented in subsequent sections.

Truck trips are primarily generated by manufacturing, wholesale/distribution, and retail uses. Manufacturing industries tend to produce and attract long haul truck trips that originate and are destined for locations that are over 250 miles in length. In the Puget Sound region, manufacturers also attract and generate short haul trips (250 miles or less) from local ports and other local manufacturers. Wholesale industries, that distribute goods throughout the region, attract long haul and short haul truck trips, and generate the majority of the local truck trips (less than 50 miles in length). Retail industries are the primary attraction for local distribution truck trips generated by the wholesale industries.

South King County, where SR 167 is located, has the largest concentration of manufacturing and wholesale/distribution industries in the Pacific Northwest. Thus, it also has the highest concentration of truck trips. It is the third largest distribution center on the West Coast.

An estimated 80 percent of all truck trips are local trips that are less than 50 miles in length. Long haul, short haul, and through truck trips make up the remaining 20 percent.

The total daily truck volume on SR 167 just south of South 212th Street is approximately 12,110 trucks, or 9.7% of all traffic. This is a high percentage of trucks compared to other

major highways in the region. For comparison, in 1998 trucks on I-5 at SR 516 represented less than 6% of the total traffic volume.

The majority of trucks travel during daytime hours to meet the operating schedules of the suppliers and receivers. At the same time, trucks on SR 167 are shifting to travel after the morning peak period and before the evening peak period. Approximately 44% of all truck movements occur between 9 a.m. to 3 p.m.

The northbound peak truck flow of 470 trucks occurs from 10:00 to 11:00 A.M. During this hour, single unit trucks are 54% of the truck volume, followed by tractor trailer trucks with one trailer as 42 %, and tractor trailer trucks with two trailers are 4%.

The southbound peak flow of 485 trucks occurs from 1:00 to 2:00 P.M. During this hour, single unit trucks are 60% of the truck volume, followed by tractor trailer trucks with one trailer as 36% and tractor trailer trucks with two trailers are 4%.

WSDOT data shows that from 32,300 to 129,400 average daily trips are made on SR 167, between Puyallup and Renton. These trips result in a facility over its capacity for multiple hours of the day in the morning and evening peak periods. (*Source: Existing Conditions Technical Memorandum, Appendix A, Traffic Data, Preliminary Draft, December 2005, Perteet*) As a result, freight haulers and commuters are faced with up to six hours of congestion on weekdays.

Truck crashes are approximately 12% of all crashes, but less than 10% of the total traffic volume. Crashes involving trucks on the mainline are more often rear-end crashes that typically result from congested conditions. Crashes at the ramps are more often sideswipes associated with complex merge or diverge maneuvers due to short ramps (and slow truck speeds) and congestion.

The 53 truck freight survey respondents reported a total 4,177 daily truck trips. The size of the companies' truck operations varied considerable, from 2 trips per day to 840 trips per day. These truck volumes generated by these 53 companies equates to approximately 28% of the daily truck volume on SR 167 at South 212th Street.

The truck survey respondents mentioned I-5 as their primary alternative route, followed by West Valley Highway and East Valley Highway.

What is the need for freight mobility on SR 167?

SR 167 is the primary route connecting the Port of Tacoma, the Green River Manufacturing and Distribution Center, and the greater Seattle metropolitan area. Approximately one-third of the region's trucking and storage facilities are located in the corridor, making the SR 167 corridor the region's largest

freight distribution center, and the third largest on the West Coast.

The Washington Transportation Plan recognizes three components of Washington State’s freight system, all directly related to the strength of the state’s economy. The three components of Washington State’s freight system are:

- Global Gateways – International and national trade flows through Washington
- Made in Washington – Regional economies rely on the freight system
- Delivering Goods to You – the retail and wholesale distribution system

The SR 167 corridor is a vital link the state’s freight system and supports all three components of the Washington Transportation Plan. This vital link was recognized by the state in 1995 when the State’s Freight and Goods Transportation System (FGTS) was adopted by the Transportation Commission in 1995. The resulting classifications range from T-1 which includes roadways that carry over 10,000,000 tons per year, to T-5 which includes roadways that carry over 20,000 tons in 60 days (used in agricultural areas). Exhibit E-1 summarizes the classifications and the corresponding tonnage and approximate number of large trucks per day for each.

Exhibit A-1

Freight and Goods Transportation System Classifications

FGTS Classification	Annual Gross Tonnage	Approximate Number of Large Trucks per Day
T-1	Over 10,000,000	Over 800
T-2	5,000,000 to 10,000,000	400 to 800
T-3	300,000 to 5,000,000	24-400
T-4	100,000 to 300,000	8 to 24
T-5	Over 20,000 in 60 Days	--

Source: Washington State Legislative Transportation Committee, Resolution 516, March 16, 1995.

Interstate 5, SR 167, Interstate 405, SR 99 (between SR 509 and SR 599), and East Marginal Way (between Spokane Street and SR 599) are classified as T-1 roadways. SR 181 and S 188th Street are classified as T-2 roadways. T-3 roadways in the area include SR 509, SR 518, SR 599, SR 516, and SR 99 (between SR 599 and SR 516).

Increasing congestion is reducing the corridor’s ability to support the world class economy of Washington State. Congestion wastes time and makes freight deliveries and services unpredictable, adding costs and making the region less competitive in the global and national markets. Freight movement relies on “just in time” delivery, which is impossible

when the freeway is over capacity and travel time along the corridor is unreliable.

In addition, the communities using the corridor are expected to grow in the coming years. This will add to the congestion and intensify the safety issues. The corridor must function with a mix of commuter traffic and a high volume of truck traffic.

What will affect growth in truck traffic on SR 167?

The jurisdictions within the corridor study area have adopted planned land uses that will result in additional housing, employment, and industrial/manufacturing uses. The SR 167 Corridor Plan effort includes the development of a truck forecasting tool. Truck forecasts are based on the increase in development for truck generating business and the number of employees at those businesses.

The cities of Auburn, Kent, Puyallup, and Renton are designated as Regional Growth Centers by the Puget Sound Regional Council. The City of Kent is designated a Regional Manufacturing and Industrial Center. Regional Growth Centers are intended to accommodate higher growth in population and employment that can be served by existing and improved urban infrastructure. Major transportation infrastructure includes highways such as SR 167, SR 181, SR 516, and SR 18; major arterial corridors such as S 180th Street, S 277th Street, and 8th Street S; Sound Transit Commuter Rail, and King County Metro Bus Service. In addition to employment growth in the centers, the east plateau has planned land use that will increase population and residential traffic accessing SR 167 from east-west arterials.

And finally, the dramatic growth in container traffic experienced by the Ports of Seattle and Tacoma is expected to continue and affects the SR 167 Corridor. Between 25% and 35% of the international containers entering the Ports of Seattle and Tacoma are delivered to the Puget Sound industries and consumers (FAST Corridor Project, March 2005). Containers are unloaded at the ports and then moved by truck to the distribution centers, almost all of which is located in the SR 167 corridor. The 2004 Marine Cargo Forecasts concludes that the Ports can expect a 4% per year growth in container traffic from 2002 to 2025, approximately a 50% increase every 10 to 11 years. The need to provide reliable truck freight mobility is urgent.

What are the operating concerns of moving freight?

The ability to move freight by truck through the Puget Sound region is important to the economic well-being of the region. Businesses that manufacture, distribute, and ultimately, sell goods to customers all rely on trucks to move the goods from the plant to the warehouse to the store. Even goods that arrive or depart the Puget Sound on a ship, train, or plane are moved by truck to the dock, rail terminal or airport. In today's fast-

paced, competitive global markets there are four primary concerns of truck freight movement on the roadway network. They are:

- **Reliability** – Consistency in travel time allows businesses to assure delivery schedules. Unpredictable time delays associated with severe congestion, long train blockages, accidents, and construction must be minimized.
- **Cost of Freight Movement** – Cost is attributable to many factors including the total amount of time needed to move the freight (labor and operational costs), the cost of equipment (including wear-and-tear caused by inadequate roads), fuel consumption, and the cost of labor.
- **Safety** – Crashes involving trucks or trains often involve injuries and/or fatalities. The freight itself can also be damaged. In addition, crashes or other freeway incidents delay other freight movements that can affect reliability.
- **Capacity** – Capacity is related to both the cost and reliability of freight movement.

Reliability and cost are the most important from the perspective of businesses. Reliability is important because an unreliable transportation system can interrupt production schedules; create a need to increase inventory which in turn increases the cost and loss associated with obsolescence; increase spoilage and damage to goods, and reduce overall competitiveness of the Puget Sound region.

What generates truck traffic?

To understand the volume and necessity to safely provide for truck traffic, it is important to consider how a truck trip is generated, and once generated, the reasons a truck driver would choose a certain route. Truck trips are produced and attracted by certain types of industries. Manufacturing industries tend to produce and attract long haul truck trips that originate and are destined for locations that are over 250 miles in length. In the Puget Sound region, manufacturers also attract and generate short haul trips (250 miles or less) from local ports and other local manufacturers.

Wholesale industries, which distribute goods throughout the region, attract long haul and short haul truck trips and generate the majority of the local truck trips (less than 50 miles in length). Retail industries are the primary attraction for local distribution truck trips generated by the wholesale industries. To put perspective on the types of truck trips occurring in our region, an estimated 80% of all truck trips are local trips that

are less than 50 miles in length. Long haul, short haul, and through truck trips make up the remaining 20%.¹

Regionally, existing manufacturers are located along Interstate 5 and SR 167 with concentrations in Renton, Kent, Boeing Field, Duwamish industrial area, and downtown Seattle. Wholesale industries are located along this same spine and extend further south into Pierce County. New distribution centers are being constructed further south in Thursday and Lewis counties. Retailers tend to be more scattered, with the largest concentrations located in Seattle between Ballard and the Duwamish industrial area, in Bellevue, and in the Southcenter/Tukwila area. Truck traffic is generated by all of these entities with long-haul trucks coming from areas outside the region with inputs into the manufacturing process or goods to the distribution centers. Goods are also delivered to the manufacturing and distribution centers from other local sources with short-haul trips. The final trip to the retail store is almost always a short-haul trip.

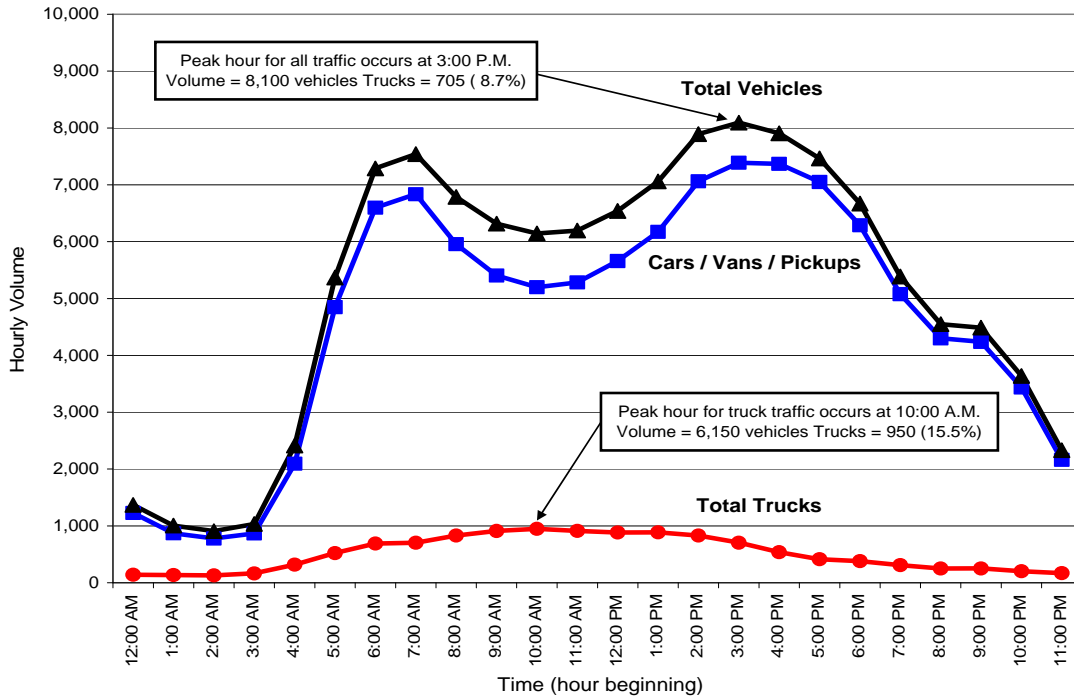
What are the existing truck volumes?

The WSDOT maintains a permanent traffic data recording station (P6) on SR 167 just south of the South 212th Street interchange. Total traffic volumes, northbound and southbound, by time of day, and by vehicle classification are available. Truck volumes by truck type are available including the single-unit delivery truck, the double-axle truck, and the triple-axle truck. The double-axle truck is the “semi-trailer truck” tractor pulling one container and the triple-axle truck is pulling two containers. Traffic volume data from the permanent traffic recorder are presented in Exhibit E-2 to Exhibit E-6.

Total traffic volumes by hour of the day are presented in Exhibit E-2. The peak traffic volume on SR 167 occurs from 3:00 to 4:00 P.M. at about 8,100 vehicles per hour. During this peak hour, about 705 of the vehicles are trucks, or about 9% of the total traffic. Additional analysis of the total traffic volumes and levels of congestion is discussed in the draft of the *SR 167 Corridor Plan, Technical Memorandum #3, Existing Conditions*. Truck traffic volumes peak at about 950 vehicles per hour between 10:00 to 11:00 A.M., which is about 15.5% of all traffic during this hour. Truck traffic volumes begin to increase in the morning hours, at the same time of that general traffic volume increase steeply. Truck volumes are highest between about 8:00 A.M. and 2:00 P.M. then decrease as the PM peak hour approaches. Although truck volumes are lower during peak commuter periods, these data show that trucks do not (or cannot) avoid traveling during the commuter peaks.

¹ Source: PSRC's *Planning for Freight Movements in the Puget Sound Region*, January, 1995.

Exhibit A-2
SR 167 Traffic Volumes by Time of Day – All Vehicle Types

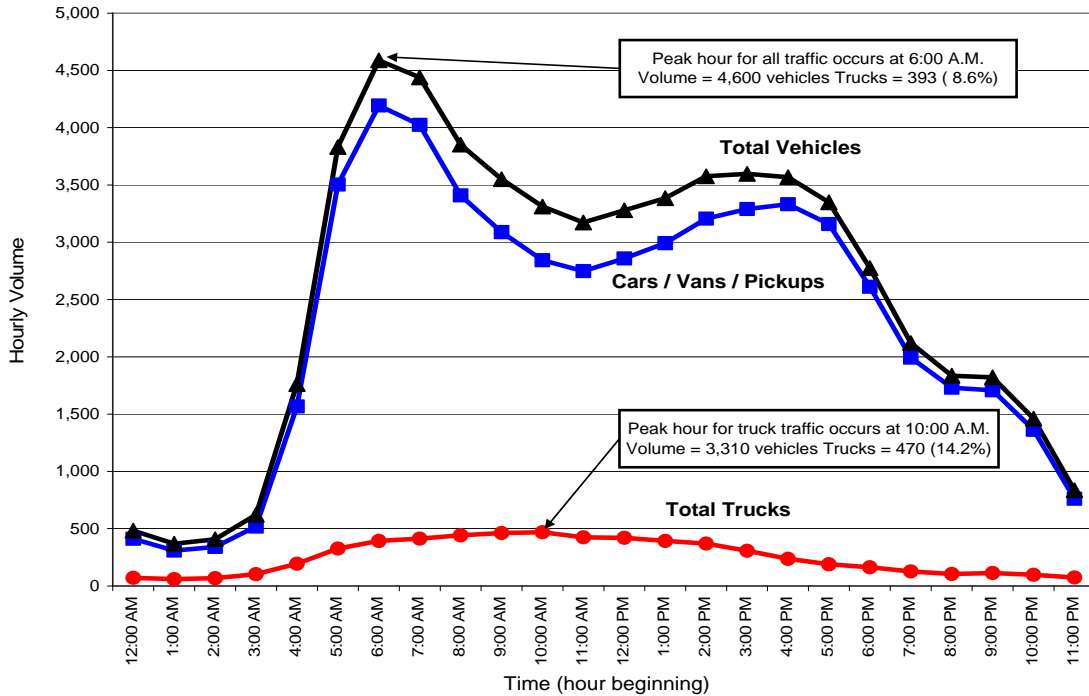


Source: Truck classification counts performed by WSDOT Permanent Traffic Recording Station P6 (SR 167 south of South 212th Street interchange), May 2004, Tuesday, Wednesday, Thursday data.

Exhibit E-3 presents the northbound volumes and Exhibit E-4 presents the southbound volumes for all vehicle types. The northbound volume by time of day clearly shows the morning peak hour reaching a maximum from 6:00 to 7:00 A.M. These volumes include the High Occupancy Vehicle (HOV) lane for carpools and buses. The peak northbound truck volume of 470 trucks occurs at 10:00 A.M. although the hour before and after are almost equal in volume

Exhibit A-3

Northbound SR 167 Traffic Volumes by Time of Day – All Vehicle Types

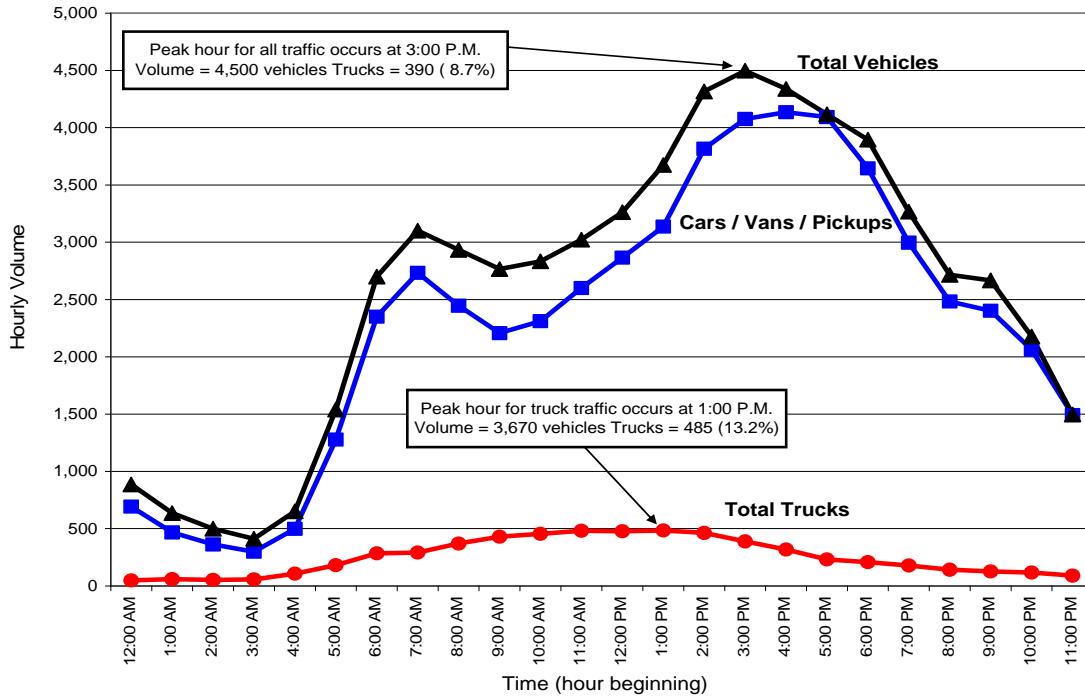


Source: Truck classification counts performed by WSDOT Permanent Traffic Recording Station P6 (SR 167 south of South 212th Street interchange), May 2004 Tuesday, Wednesday, Thursday data.

The southbound volume by time of day shows the evening peak period reaching maximum volumes from approximately 3:00 to 6:00 P.M. These volumes include the High Occupancy Vehicle (HOV) lane for carpools and buses. The peak southbound truck volume occurs at 1:00 P.M. with 485 trucks per hour, although the volumes are fairly consistent, and above 400 trucks per hour, from 9:00 A.M. to 3:00 P.M. These data indicates that many of the southbound trucks are traveling on SR 167 before the PM peak hour.

Exhibit A-4

Southbound SR 167 Traffic Volumes by Time of Day – All Vehicle Types

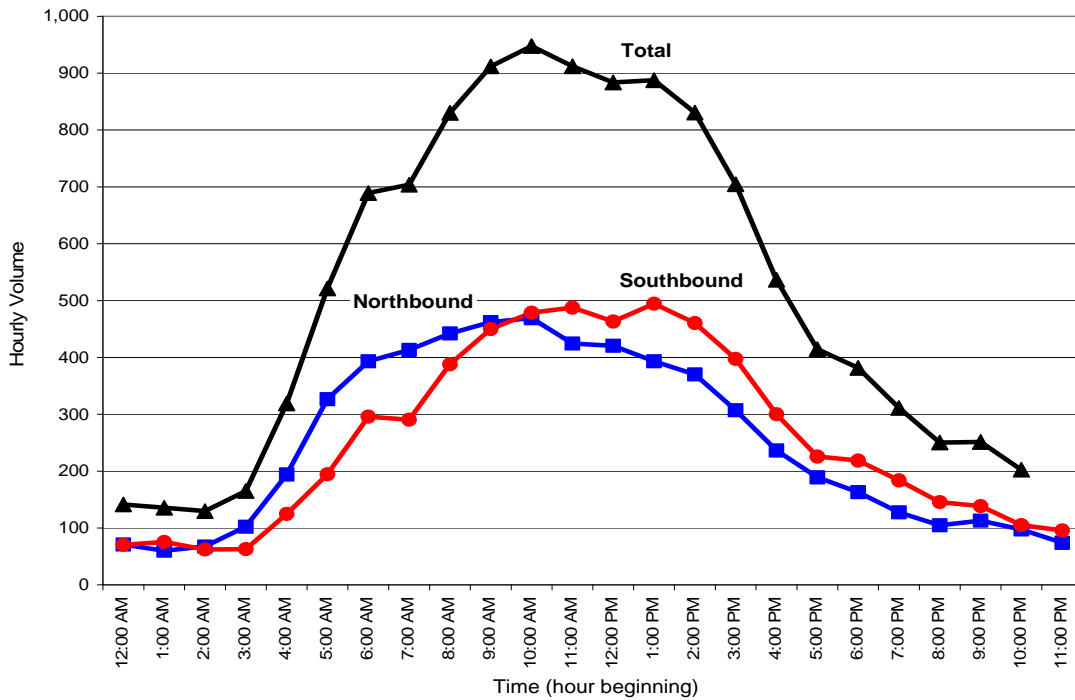


Source: Truck classification counts performed by WSDOT Permanent Traffic Recording Station P6 (SR 167 south of South 212th Street interchange), May 2004 Tuesday, Wednesday, Thursday data.

As previously shown on Exhibit E-2, the peak northbound and peak southbound truck volume is about 15.5% of total traffic at about 10:00 A.M. However, it can be observed that most of the truck traffic travels in the right lane. In the segment of SR 167 approaching I-405, northbound trucks are almost entirely in the right lane in order to access northbound I-405. In the analysis of lane capacity, trucks, on average, are considered the equivalent of 1½ passenger cars on flat terrain, with higher values depending on the grade and proportion of trucks in the traffic stream. Given the high percentage and longer length of trucks, it can appear as though there is a “wall of trucks” on northbound SR 167 approaching the northbound I-405 ramp.

Exhibit E-5 shows the comparison of northbound and southbound truck volumes for all classes of trucks. This chart shows that the truck volume by time of day is fairly similar in the northbound and southbound directions. The actual peak for northbound truck traffic occurs from 10:00 to 11:00 A.M. and the southbound peak is from 1:00 to 2:00 P.M. Approximately 44% of all trucks travel from 9:00 A.M. to 3:00 P.M., between the general-purpose traffic peak periods.

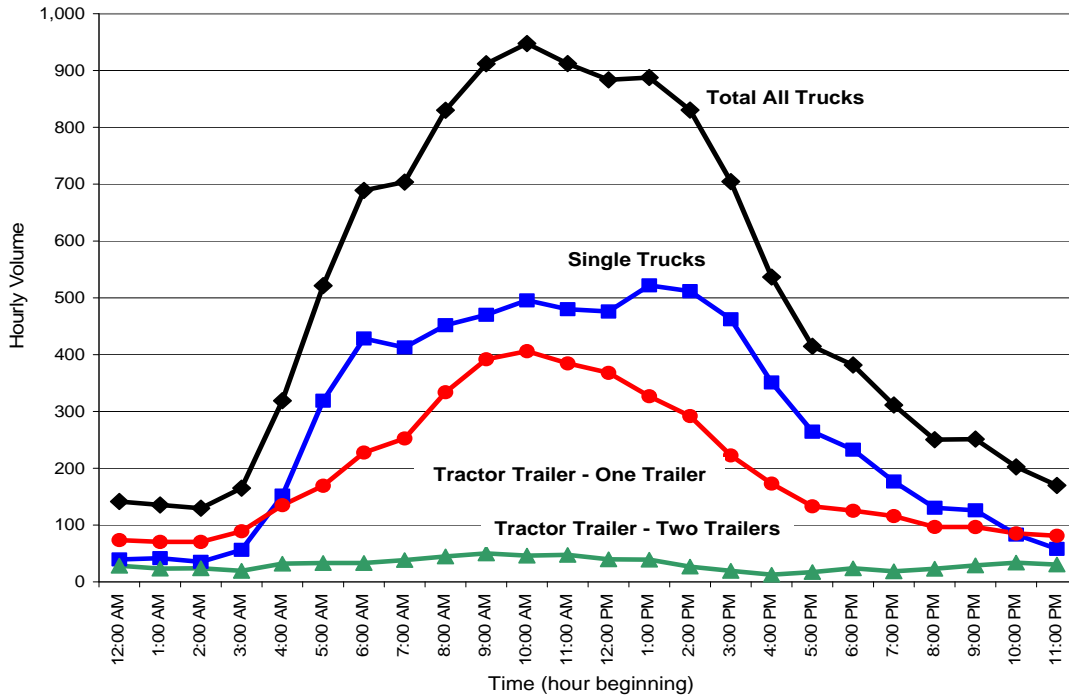
**Exhibit A-5
Northbound vs. Southbound SR 167 Truck Traffic Volumes**



Source: Truck classification counts performed by WSDOT Permanent Traffic Recording Station P6 (SR 167 south of South 212th Street interchange), May 2004 Tuesday, Wednesday, Thursday data.

Exhibit E-6 shows the truck classification and volume profile for all trucks on SR 167. The tractor trailer truck with one and two trailers are 52% of all truck traffic on the SR 167 corridor, demonstrating the function of SR 167 to carry traffic to and from the region's distribution center.

**Exhibit A-6
SR 167 Truck Classifications**



Source: Truck classification counts performed by WSDOT Permanent Traffic Recording Station P6 (SR 167 south of South 212th Street interchange), May 2004 Tuesday, Wednesday, Thursday data.

Crash data were obtained from WSDOT for the three-year period from August 1, 2002 to July 31, 2005. These are the most recent data available. The crash information was analyzed to determine the total number and type of crashes involving trucks on mainline segments at ramps. The complete data summary by northbound and southbound, for mainline and ramp segments is in Appendix A. Exhibit E-7 summarizes the crash data.

Exhibit A-7

SR 167 Truck Crash Summary – 8/1/02 through 7/31/05

Location	Crashes Involving Trucks (Number of crashes in three years and percent of all truck-related crashes)				Fatalities and Injuries from Truck-related Crashes	
	Rear-end	Sideswipe	Other	Total	Fatalities	Injuries
Northbound Mainline	43	32	28	103	0	52
	42%	31%	27%	100%		
Northbound Ramps	15	19	11	45	0	14
	33%	42%	25%	100%		
Southbound Mainline	40	28	26	94	0	31
	43%	30%	27%	100%		
Southbound Ramps	11	11	11	33	0	12
	33%	33%	34%	100%		
Totals	109	90	76	275	0	109

The total number of crashes in the corridor for this period (trucks plus all other non-truck crashes) was 2,230 with 1,622 mainline crashes and 608 crashes on the ramps. Trucks were involved in 275 of these crashes or about 12% of the total crashes. This is higher than the proportion of trucks using SR 167; the truck volume is 10% of the total traffic volume. There were zero fatalities recorded on SR 167 during the three-year analysis period. There were a higher number of northbound crashes than southbound, with slightly lower volumes in the northbound direction.

Rear-end and sideswipe crashes were the most common, at 40% of all truck crashes. Rear-end crashes predominantly occur in congested, stop and go conditions. Sideswipe crashes occur with weaving, merge, and diverge maneuvers and the occurrence increases with increasing volumes, complex maneuvers, and/or with sub-standard conditions such as short merge lengths. Sideswipe crashes also increase with greater differences in the speed of the on-ramp vehicle and the mainline vehicle. Trucks in particular, if faced with a short ramp merge, or a steep ramp climb will be at a much slower speed than the mainline vehicle. This can increase the complexity of the merge maneuver and increase the crash rate.

Mainline crashes were 70% of the northbound crashes and 74% of the southbound crashes. There was a lower proportion of sideswipe crashes on the mainline. The proportion of sideswipe

crashes increased at ramp locations. Notable findings of the detailed crash data for trucks are summarized by location in the bullets below. Anecdotal information about safety concerns was received from corridor businesses that answered the *Truck Freight Survey*. Relevant comments from that survey are also presented below. Further information from the survey is presented later in this memorandum. Finally, potential bottleneck projects have been suggested for some of the locations where safety issues may exist. These are also listed below.

- Northbound mainline between SR 161 at the beginning of the SR 167 freeway segment to the SR 512 on-ramp had 7 sideswipe crashes and 2 overturned trucks.
- Northbound on-ramp from SR 512 and on the collector distributor lane had 5 sideswipes and 1 overturned truck. One truck survey respondent identified the SR 410 exit as a problem.
- Northbound on-ramp at SR 18 had two trucks that hit the guardrail. Survey respondents noted poor design at this location, poor visibility at the merge, problems with lane changes, and safety concerns at the SR 18 on/off ramps. This is the location of a potential bottleneck project.
- Northbound mainline from 15th Street NW off-ramp to south of South 277th Street off-ramp had 1 truck that hit the guardrail and 1 truck over the embankment where there is no guardrail. Survey respondents noted a short ramp at 15th Avenue NW and design problems with ramps at 15th Street NW. This is the location of a potential bottleneck project to improve SR 167 ramps at 15th Street NW.
- Northbound mainline segment from SR 516 (Willis Street) off-ramp to approximately one-half mile north of Meeker Street had 6 rear-end crashes. There were also three truck crashes involving a parked vehicle on the freeway. Survey respondents noted difficulty merging during congested periods, and the steep grade on the on-ramp from Willis Street. This is the location of a potential bottleneck project to add auxiliary lanes in this segment.
- Northbound mainline north of the Central Avenue on-ramp to approximately 0.6 miles south of the S 180th Street over-crossing had six sideswipe crashes, and two trucks that hit the concrete barrier.
- The northbound mainline in the segment from just north of S 180th Street to just south of the S 180th Street over-crossing had 1 overturned truck. A potential bottleneck project would add one northbound and one southbound lane to reduce congestion in this segment.

- The northbound mainline from S 180th Street to I-405 had 10 rear-end crashes. Survey respondents consistently noted congestion as the problem on SR 167. This is the most congested segment and has the highest number of rear-end crashes.

Notable findings in the southbound direction are summarized in the bullets below, with comments from the Truck Freight Survey and a note on the potential bottleneck project at locations with projects.

- The southbound mainline in the segment just south of the SR 516 on-ramp to just north of the S 277th Street off-ramp had 5 rear-end crashes. This is the location of a potential bottleneck project to add auxiliary lanes in this segment, which would relieve congestions and reduce the potential for rear-end crashes.
- The southbound mainline from the S 277th Street exit to 15th Street NW over-crossing had seven rear-end crashes. Survey respondents consistently noted congestion as a problem. This problem could result from the congestion that backs up from the end of the HOV lane, and completion of the HOV lane could reduce some of the crashes.
- The southbound mainline from the SR 18 on-ramp to south of the Ellingson Road on-ramp had eight rear-end crashes, six sideswipe crashes, and three other crashes including a truck that hit the guardrail. The HOV lane completion, from 8th Street E to SR 410 will add capacity and relieve congestion. Specifically, the completion will reduce the congestion that occurs where three lanes reduce to two lanes.
- The southbound mainline from south of Jovita Boulevard off-ramp to SR 410 on-ramp had four rear-end crashes, five sideswipe crashes, and five other type crashes. The HOV lane completion, from 8th Street E to SR 410 will add capacity and relieve congestion. Specifically, the completion will reduce the congestion that occurs where three lanes reduce to two lanes.
- The southbound mainline from the SR 512 off-ramp to the SR 512 over-crossing had five sideswipe crashes.

What are truck operating characteristics on urban freeways?

Trucks are bigger and heavier than passenger vehicles. Therefore, they have longer stopping distances, and are more adversely impacted by uphill grades. SR 167 is a flat roadway, but with some steep ramps that affect a truck's ability to increase speeds adequately before needing to merge into mainstream traffic. At slower merge speeds, trucks impact the speed and flow of mainline traffic, and the resulting effective capacity.

One of the most significant concerns in the trucking industry today is schedule reliability. Reliability is defined as, “a measure of the variability in delivery time for the same trip on different days.” Reliability is critical to businesses that operate with “just-in-time” delivery. It reduces the need to maintain large inventories and thus reduces costs related to storage, spoilage, and obsolescence. Delivery schedules are most affected by unexpected delays such as those caused by weather, crashes, and construction. Unexpected delays related to accidents can make a system unreliable.

The crash data shows that there are on average, two crashes per day on SR 167 between Puyallup and Renton. Although no data are available related to the average delay per vehicle that such accidents cause, some estimates indicate that each minute that a lane is blocked causes an additional four minutes of delay.

What was learned from the Truck Freight Survey?

The SR 167 Corridor Plan included the preparation and mailing of a truck freight survey to 428 companies based on lists provided by the local jurisdictions. There were 53 respondents to the survey.

Collectively, the survey respondents reported 4,177 daily truck trips, of which 2,071 were inbound and 2,106 were outbound. The size of companies’ truck operations varied considerably—from 2 trips per day to 841 trips per day. The average number of daily truck trips (inbound and outbound) per respondent was 84 and the median number of trips per day was 27. The two companies with the greatest number of daily trips accounted for 40% of the total daily trips, hence the large gap between the mean and median.

Other highlights of the survey are listed below:

- Approximately 73% of trips inbound to these facilities originate in Washington State, including the Ports of Seattle and Tacoma. This is followed by Oregon (17.2%), Idaho, (3.7%) and California (2.4%).
- The most common alternative route is I-5 followed by West Valley Highway and then East Valley Highway-Auburn Way.
- In response to operational problems, congestion at the I-405 interchanges received the most comments followed by congestion in general. However, congestion concerns were raised throughout the corridor.
- There were many comments related to ramp design issues throughout the corridor. These comments correspond well to the locations where bottleneck projects are proposed.

- Fifteen of the 50 respondents were willing to pay a toll to decrease travel time, and 14 were willing to pay a toll to decrease congestion. There were a few comments expressing opposition to tolls.

How do the Potential Bottleneck Projects benefit truck mobility?

The SR 167 Corridor Plan includes the development of short range improvement projects to address key bottlenecks in the corridor. The purpose is to provide urgently needed congestion relief while the funding and design of the full SR 167 Corridor Plan is developed. Exhibit E-8 summarizes the truck mobility benefits of the potential bottleneck projects. In summary, the potential bottleneck projects will:

- Improve safety, by improving location specific safety issues, especially ramp design issues, reducing the frequency of crashes in the corridor and reducing bottleneck congestion that results in crashes.
- Increase capacity on SR 167 in advance of full development of the preferred alternative for SR 167. An increase in capacity would also reduce impacts on regional arterials, which carry a significant amount of the truck traffic in the Green River Valley.

Exhibit A-8

Potential Bottleneck Projects – Summary of Truck Mobility Benefits

Project (listed north to south for reference to map)	Survey Input	Truck Mobility Benefit
SW 27th Street (Strander) connection	None	Connects high priority arterial project from I-5 to SR 167
43rd Street/S 180th Street interchange modifications	Short ramp at SW 43rd Street	Major corridor for Kent trucking and distribution centers
South 180th Street to 84th Avenue NB/SB Add one northbound and one southbound general purpose lane	Congestion on SR 167	Adds capacity in one segment
Smith Street – Commuter Direct Access Ramp	None	Not applicable
SR 516 to S 277th Street NB/SB Auxiliary lanes	Difficulty merging during congested periods Short ramp at South 277th Street Steep grade from Willis Street	Opportunity to address ramp and merging issues, adds capacity to SR 167
SR 18 Interchange: add missing ramps EB SR 18 to SB SR 167 and NB SR 167 to WB SR 18	None	Improves accessibility for freight movements. Providing for general purpose traffic needs may reduce traffic volumes through interchange
SR 18 Ramp Improvements	On-ramps: northbound SR 167 at SR 18 Poor visibility at SR 18 merge point Safety concern with SR 18 merge on to SR 167 Concern with lane changes	Addresses truck operating concerns
15th Street SW to SR 167 Ramp Improvements	Short ramp at 15th Avenue NW Poor visibility at 15th Avenue SW southbound	Addresses truck operating concerns
8th Street Ramp Improvements	Merging onto SR 167 at 8th Street (WTA luncheon)	Addresses truck operating concerns
HOV Completion Stage 5, 8th Street E to SR 410	Too few lanes Congestion (12 general comments)	HOV lane is an additional lane that removes passenger cars from general purpose lane and increases available capacity for trucks.
Sound Transit Flyer Stop vicinity SR 410	None	Not applicable, although reconstruction is an opportunity to address design issues
SR 512- SR 410 Interchange modifications	Poor visibility at SR 167 and SR 512 merge point SR 410 exit ramps Concern with lane changes	Addresses truck operating concerns
Other Recommended Projects from Survey	Signal needed at 8th/Jovita exit	Reduces delay for off-ramp traffic.
Survey responses addressed by other long term projects	On ramp lane for I-405 north should start back by Valley Medical Center Short ramp at I-405 and SR 167 Congestion at SR 167/I-405	I-405/SR 167 design to reconstruct interchange with through movement north-south from SR 167 to I-405. (I-405 Corridor Program)
Survey input not addressed by recommended bottleneck projects	South 212th Street short ramp South 212th Street turning radius Steep grade Central Avenue SB Ramp metering at Central Ave NB on-ramp should end at 9 a.m. Congestion exiting at South 212th Street Safety concern on SR 167 at 250th Street Concern with lane changes at C Street in Auburn	

Exhibit A-9

SR 167 Northbound Truck Crash Summary (August 1, 2002 – July 31, 2005)

Location Description	SR 167 Milepost	Fatalities and Injuries		Crash Type			Other Notes
		Number Fatalities	Number Injuries	Rear-end	Side-swipe	Other	
NB Mainline, SR 161 begin SR 167 freeway to SR 512 on-ramp	5.26-6.18	0	4	1	7	4	1 other type crash 1 parked--one moving 2 overturned
NB On-ramp at SR 512 and collector-distributor lane	6.33-7.44	0	5	2	5	4	1 other object 1 overturned 1 other crash 1 non-collision
NB On-ramp at SR 410	10.14	0	1	1	0	0	Both moving
NB On-ramp from 8th Street E to 8th Street E over crossing	10.39-10.65	0	2	3	0	1	1 other crash
NB Mainline s/o of Ellingson Road on-ramp to just n/o SR 18 under crossing	11.77-14.53	0	8	6	4	5	4 other crash 1 non-collision
NB On-ramp at SR 18	14.64-14.65	0	0	0	0	2	2 Hit guard rail
NB Mainline vicinity of West Main Street over crossing	14.88-14.95	0	1	2	2	1	1 other crash
NB Off-ramp to 15th Street NW	15.46-15.59	0	0	2	2	1	1 other crash
NB Mainline from 15th Street NW off-ramp to s/o S 277th Street off-ramp	15.60-17.42	0	2	3	4	2	2 left-turn sideswipes 1 Hit guard rail 1 over embankment (no guardrail)
NB Off-ramp at S 277th Street	17.67	0	1	0	5	1	1 right-turn/straight crash
NB Mainline S 277th Street over crossing to s/o S 277th Street on-ramp	17.92-18.05	0	2	1	1	0	
NB On-ramp S 277th Street	18.15	0	1	2	0	0	
NB Mainline half way between S 277th Street and SR 516	18.97-18.99	0	3	2	0	0	
NB Off-ramp at S SR 516 (Willis Street)	19.30	0	0	1	1	0	
NB Mainline at SR 519 off-ramp	19.30	0	1	0	1	0	
NB Off-ramp at SR 519	19.30	0	0	0	1	0	
NB Mainline from SR 516 off-ramp to 1/2 mile n/o Meeker Street	19.35-19.35	0	1	6	2	2	1 other crash
NB Off-ramp to N Central Ave	21.10	0	2	1	0	0	
NB Mainline just n/o N Central Ave off-ramp to just north of N Central Ave on-ramp	21.21-21.47	0	5	2	1	1	1 other crash
NB On-ramp from N Central Ave	21.71-21.78	0	1	2	2	1	1 right turn/straight
NB Mainline n/o N Central on-ramp to 0.6 miles s/o S 180th St over crossing	21.91-23.80	0	5	2	6	7	3 one parked/one moving 2 other crash 2 Hit concrete barrier
NB Off-ramp to S 180th Street	24.15	0	0	1	0	0	Both turning left
NB Mainline vicinity S 180th Street over crossing	24.41-24.43	0	14	3	2	4	2 other crash 1 parked/one moving 1 hit guardrail
NB Mainline n/o S 180th Street over crossing to s/o S 180th Street on-ramp	24.50-24.60	0	3	2	1	1	1 overturned 1 rear-end from stop
NB On-ramp from S 180th Street	24.73-24.77	0	1	0	3	1	1 parked/one moving
NB Mainline from S 180th Street on-ramp to s/o I-405	24.78-25.60	0	3	10	1	1	1 other crash

References

- BST Associates, *2004 Marine Cargo Forecasts Technical Report*, May 19, 2004.
- Heffron Transportation, Inc. *Access Duwamish Truck Mobility Report*, January 16, 1998.
- Heffron Transportation, Inc., *SR 167 Corridor Plan, Preliminary Freight Survey Results*, March 7, 2006.
- Perteet, Inc. *SR 167 Corridor Plan, Technical Memorandum #3, Existing Conditions, Draft*, December 2005
- Perteet, Inc., *Existing Conditions Technical Memorandum, Appendix A, Traffic Data, Preliminary Draft*, December 2005.
- Transmode Consultants, Inc., *Planning for Freight Movements in the Puget Sound Region*, January, 1995.
- WSDOT, *Truck classification counts at Permanent Traffic Recording Station P6 (SR 167 south of South 212th Street interchange)*, May 2004.
- WSDOT and PSRC, *FAST Corridor Project Brochure*, April 2005.
- WSDOT, *Washington Transportation Plan (WTP) and WTP Freight Movement*, December 23, 2005