Southwest Washington Regional

Transportation Council

Clark County Freight Mobility Study

Technical Memorandum 3.A.1 & 4.A.1
Existing & Future Truck Movements

Prepared By:

Heffron Transportation, Inc.

Prepared For:

RTC

December 2009

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1. Purpose and Methodology

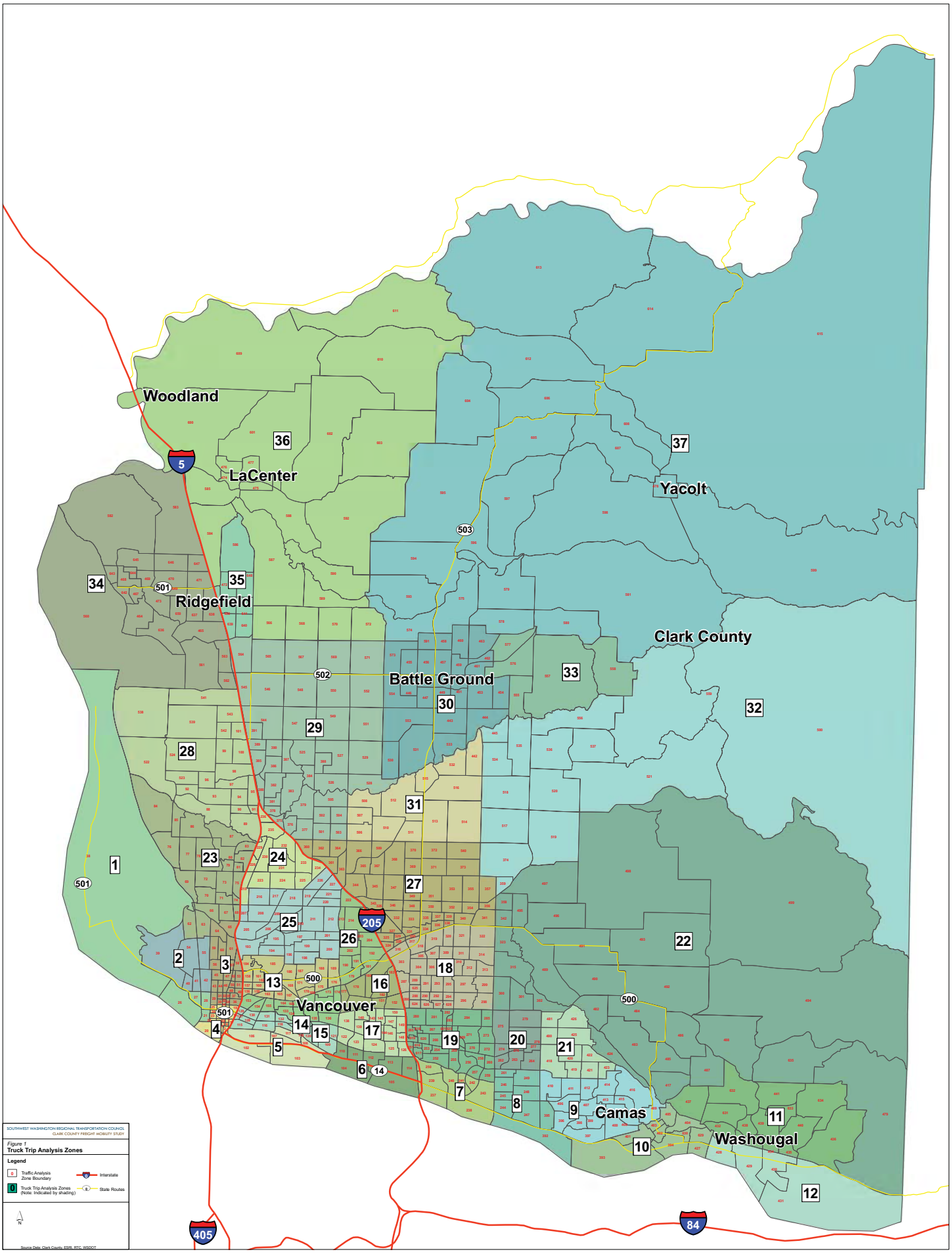
This memorandum presents growth factors to forecast truck volumes in various area of Clark County. The methodology is based on the relationship between land-side freight movement and the industries that generate freight movement. Both Portland Metro and the Puget Sound Regional Council (PSRC) use employment to forecast truck trips generated by manufacturing and industrial land uses. This memorandum presents findings that correlate the relationship between truck trips and industrial employment using actual truck volumes and employment data for Clark County,

The Regional Transportation Council's (RTC) Travel Demand Model data were used as the resource for existing employment data. The employment data are based on land use and regional employment forecasts, and available for each traffic analysis zones (TAZs). The TAZs are at a relatively small geographic scale, and so they were aggregated to form Truck Traffic Analysis Zones (TTAZs). The Truck Traffic Analysis Zones were structured to capture logical groupings of manufacturing and industrial land uses from which the truck trips would access the arterial and freeway system in the same vicinity. This approach also avoided managing small TAZs with little or no truck volume. There are 650 TAZs in Clark County that were aggregated to 37 TTAZs. The TTAZs are shown on Figure 1.

The extensive truck count database compiled for this Clark County Freight Mobility Study (Heffron Transportation, November 2009) was then used to determine the truck volumes generated by each TTAZ along major arterials. The truck volumes by TTAZ and the employment data show a strong correlation.

Finally, the projected growth in employment in various areas throughout Clark County was used to determine future truck volume growth rates. The estimated truck trip growth rates can be used for planning and programming and provide a tool for evaluating truck volumes during project design.

Figure 1.


Woodland
LaCenter
Ridgefield
Battle Ground
Clark County
Yacolt
Vancouver
Camas
Washougal
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405
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501
502
503
500
14
SOUTHWEST WASHINGTON REGIONAL TRANSPORTATION COUNCIL
CLARK COUNTY FREIGHT MOBILITY STUDY
Figure 1
Truck Trip Analysis Zones
Legend
Traffic Analysis Zone Boundary
Truck Trip Analysis Zones (Note: Indicated by shading)
Interstate
State Routes
N
Source Data: Clark County, ESRI, RTC, WSDOT

1.1 Land-Side Freight Movement by Mode

All modes of freight movement that originate or terminate in Clark County were evaluated by BST Associates for this study (BST Associates, November 2009). A summary of freight movement by mode, in tonnage and value is presented in Table 1.

Table 1. Clark County 2007 Freight Tonnage and Value by Mode

Transport Mode	Tons (1,000)[1]	% by Ton	Value ($1,000s)	% by Value	$/Ton
Ocean	5,943	18.3%	$4,660,220	17.6%	$784
Barge	2,269	7.0%	$675,383	2.6%	$298
Rail	5,625	17.3%	$4,568,740	17.3%	$812
Truck	17,920	55.2%	$15,818,286	59.9%	$883
Air	42	0.1%	$433,668	1.6%	$10,249
Pipeline	647	2.0%	$252,517	1.0%	$390
Total	32,446	100.0%	$26,408,813	100.0%	$814

1. Source: BST Associates, November 2009

Trucks account for the largest share of the freight that originates or terminates in Clark County. Trucks move approximately 55% of all tonnage and 60% by value.

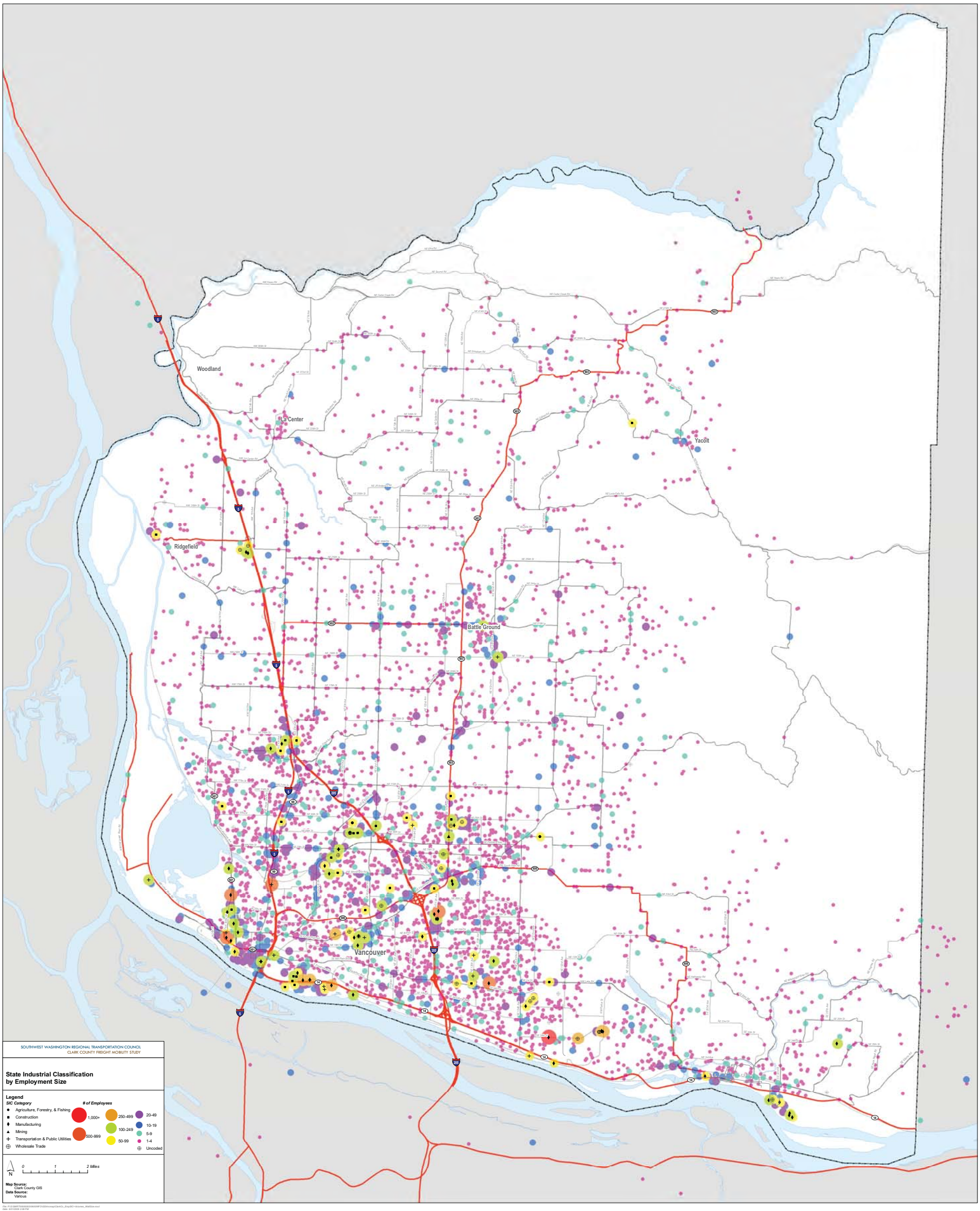
1.2 Truck Volumes and the Relationship to Employment

Truck movements in Clark County result from the variety of economic activities: distribution (including warehousing, port facilities, and intermodal facilities), manufacturing, agricultural, forestry and wood products, construction, mining, and retail businesses. Figure 2 presents the employment locations for all Standard Industrial Classification (SIC), which shows how SIC employment is distributed throughout the county.

Figure 3 shows SIC employment sites of greater than 50 employees and the daily truck volumes. The location of major SIC employment sites reflects corridors with higher truck volumes, including I-5, I-205, SR 14, W 4th Plain Boulevard, SR 501/Mill Plain Boulevard, E Mill Plain Boulevard (east of I-205), SR 503 (east of I-205, NE 78th Street, and SE 164th Avenue. These highways and arterials all carry more than 300 medium and heavy truck trips per day in each direction, or over 600 daily truck trips in both directions.

Figure 2. Firms by SIC and Employer Size

Figure 2.


Woodland
La Center
Ridgefield
Battle Ground
Yacolt
Vancouver
SOUTHWEST WASHINGTON REGIONAL TRANSPORTATION COUNCIL
CLARK COUNTY FREIGHT MOBILITY STUDY
State Industrial Classification
by Employment Size
Legend
SIC Category
Agriculture, Forestry, & Fishing
Construction
Manufacturing
Mining
Transportation & Public Utilities
Wholesale Trade
# of Employees
1,000+
500-999
250-499
100-249
50-99
20-49
10-19
5-9
1-4
Uncoded
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0
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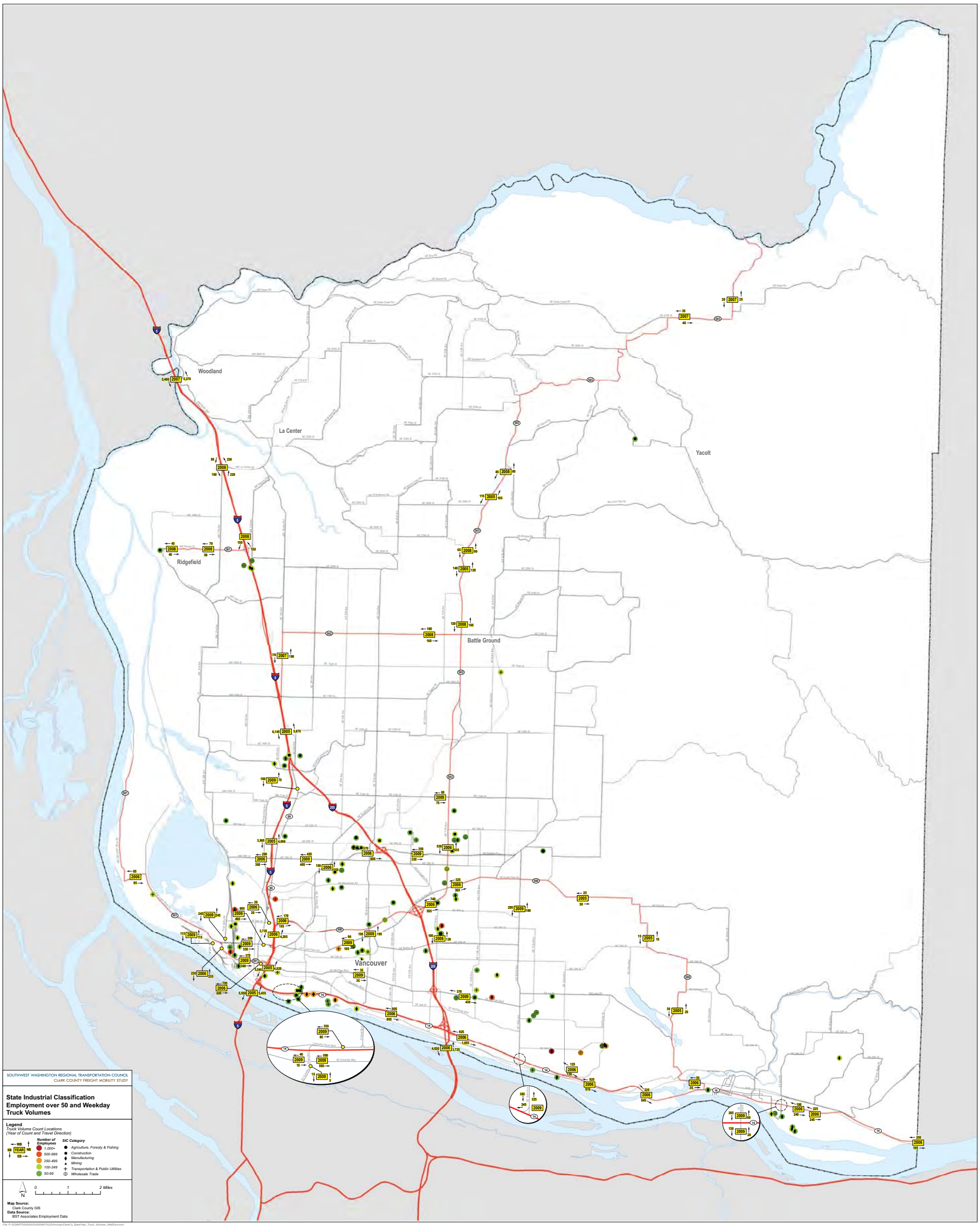
2 Miles
Map Source:
Clark County GIS
Data Source:
Various

Figure 3. SIC Employment over 50 and Daily Truck Volumes

Figure 3.


Woodland
La Center
Yacolt
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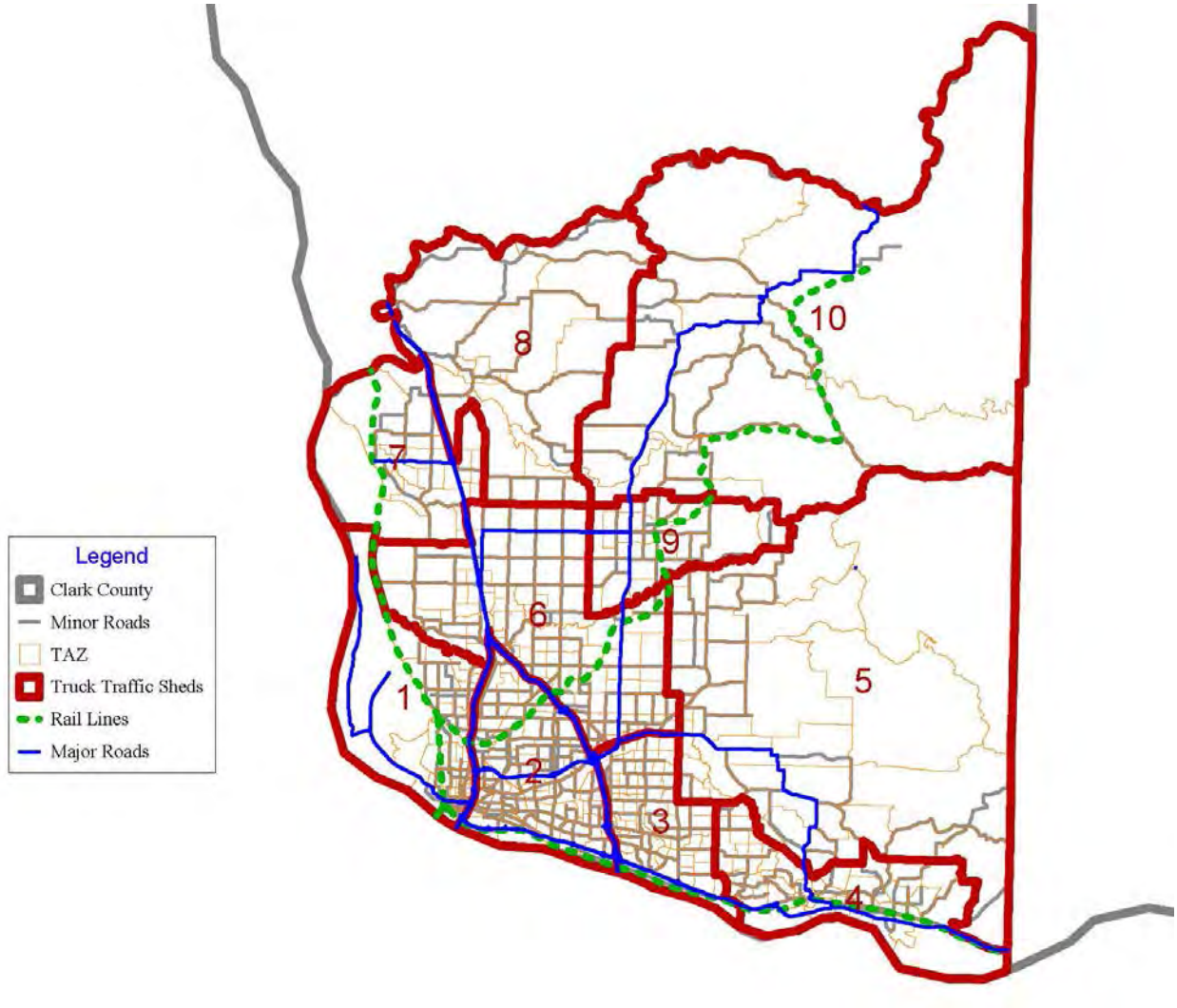
Vancouver
SOUTHWEST WASHINGTON REGIONAL TRANSPORTATION COUNCIL
CLARK COUNTY FREIGHT MOBILITY STUDY
State Industrial Classification Employment over 50 and Weekday Truck Volumes
Legend
Truck Volume Count Locations
(Year of Count and Travel Direction)
Number of Employees
1,000+
500-999
250-499
100-249
50-99
SIC Category
Agriculture, Foresty & Fishing
Construction
Manufacturing
Mining
Transportation & Public Utilities
Wholesale Trade
0 1 2 Miles
Map Source:
Clark County GIS
Data Source:
BST Associates Employment Data

The TTAZs were further aggregated into larger truck travel sheds as shown on Figure 4. Each of the travel shed boundaries act as a cordon count for truck trips.

Figure 4. Truck Travel Sheds



Source: BST Associated, November 2009.

Table 2 summarizes the industrial employment and average daily truck trips that enter or leave each travel shed. The industrial employment reflects year 2005 data for five employment types: agriculture/ forestry/mining, construction, manufacturing, transport/ communication/ public utilities, and wholesale trade. The truck trips are the average daily truck trips for large and medium trucks. These were derived from the truck count database compiled for this study and reflect data from 2005 through 2009.

Table 2. Existing Industrial Employment and Daily Truck Trips by Travel Shed

Truck Travel Shed # [a]	Area Description	Industrial Employment[b]	Average Daily Trucks (Large + Med)
1	Downtown Vancouver west of I-5	6,320	3,285
2	Area between I-5, I-205 and the Columbia River	12,271	6,824
3	East of I-205, north of River, east of Camas	7,158	3,060
4	Camas/Washougal	5,053	1,435
5	North of Camas/Washougal (SR 500)	1,173	495
6	North and east of I-205/I-5	5,123	720
7	Ridgefield	1,050	635 [c]
8	La Center, plus large rural area east of I-5	638	50
9	Battle Ground	1,645	385
10	North of Battle Ground	854	465
Total		41,285	17,354

a) See map (Figure 4) for travel shed numbers and location.

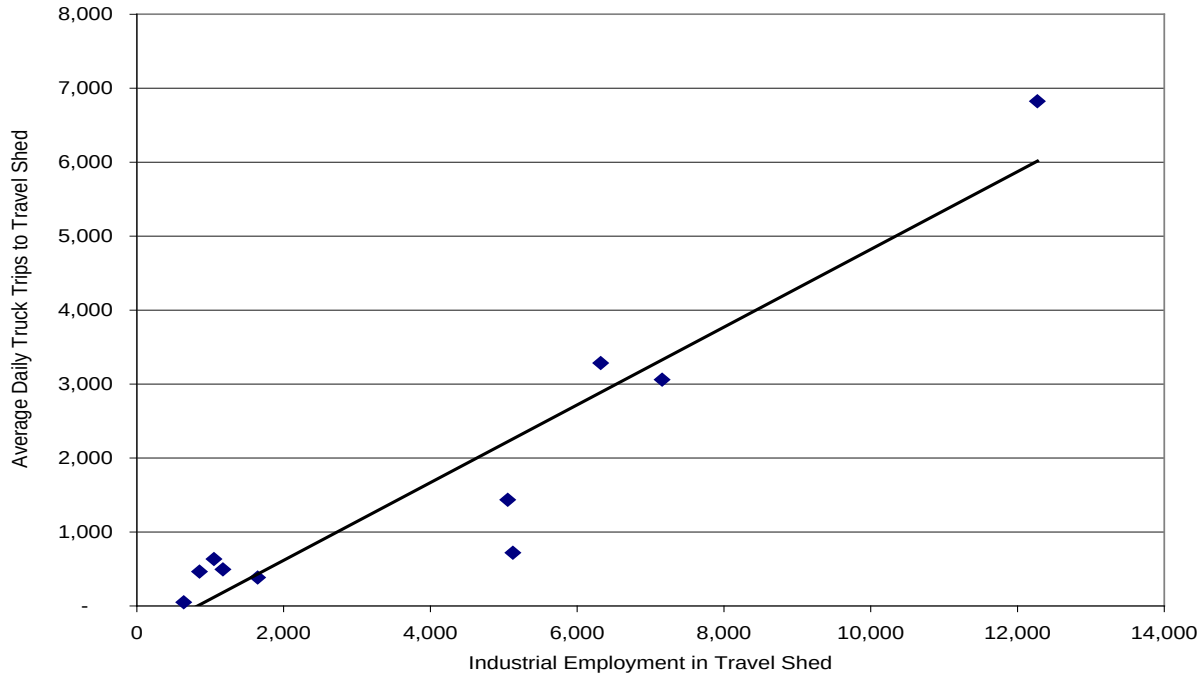
b) Source: 2005, ES-202 data. Clark County/RTC/Metro. Five employment types include: agriculture/ forestry/mining, construction, manufacturing, transport/ communication/ public utilities, and wholesale trade.

c) AWDT estimated from LaCenter ramp volumes

The industrial-related employment and truck trips for each truck travel shed was plotted as shown in Figure 5. This shows a strong correlation between employment and truck trips[1]. It is recognized that truck trips aggregated by sub-areas includes all truck trips, including those generated by commercial activity. However, many of the truck trips generated by commercial uses are small trucks such as those used for parcel delivery. The exception would be truck trips generated by grocery stores or big box retail outlets. Further research would be required to determine how those types of commercial uses affect truck volumes in each area.

[1] *The regression equation relating employment to truck trips had an R-squared value of 0.89 reflecting a high correlation rate between these two factors.*

Figure 5. Relationship of Truck Trips to Industrial and Manufacturing Employment



Sources: Vehicle classification data, numerous sources, compiled for the Clark County Freight Study (Heffron Transportation, November 2009) and 2005, ES-202 data, 2030, Clark County/RTC/Metro.

Note: Linear equation: Y = 0.5255x - 434.13 R^2 = 0.89.

1.3 Growth in Freight Movement by Mode of Travel

Cargo forecasts by mode of transport were available from the Columbia River Crossing Project. These data provide a growth rate for rail and truck cargo within the region, as summarized in Table 3. The truck mode share is smaller in Clark County (55.2% in 2007) and higher for rail (17.3% in 2007) than for the region. (BST Associates, November 2009).

Table 3. Portland-Vancouver Region Freight Cargo Forecast by Mode

	Year 2000		Year 2030		2000 – 2030 Growth Rate
Transport Mode	Tons (millions)	Percent by Mode	Tons (millions)	Percent by Mode	
Truck	197.2	67%	390.5	73%	2.3%/year
Rail	32.9	11%	50.9	10%	1.5%/year
Ocean	28.4	10%	40.3	8%	1.2%/year
Barge	15.1	5%	19.8	4%	0.9%/year
Pipeline	22.2	7%	28.8	5%	0.9%/year
Air	0.4	<1%	1.3	<1%	4.0%/year
TOTAL	296.2	100%	531.6	100%	2.0%/year

Source: Portland/Vancouver International and Domestic Trade Capacity Analysis, Columbia River Crossing Project, 2006.

The amount of all Portland-Vancouver Region freight moved by truck is expected to increase from 67% in 2000 to 73% by 2030. The increased tonnage moved by truck represents a compound growth rate of 2.3% per year over that 30-year period. This reflects the growth in trucks that travel through Clark County to reach locations in Portland (for example, through trucks on I-5 or I-205) as well as trucks originating or destined to Clark County businesses. As described later, through truck trips have increased at a slower rate than this, indicating that locally-generated truck trips have grown at a faster rate. The following sections describe both parts of the total growth.

Historic Truck Growth on I-5

The historic growth rate for medium and heavy truck trips on I-5 was 1.7% per year between 2001 and 2006 between the Columbia River and SR 500[2]. Prior analyses determined that through truck trips on I-5 represent 52% of the total truck volume. This rate is consistent with historic growth findings for Interstate 5 through Lewis County evaluated as part of the Interstate 5 Grand Mound to Mellen Street project (DEA, 2007). If the through truck trips continue to increase at 1.7% per year, then local traffic would need to increase by about 3.0% per year in order to achieve a 2.3% overall growth rate for truck trips in the region.

Employment Forecasts in Clark County

The 2030 employment forecasts for industrial and manufacturing sectors for all of Clark County reflects a 3.2% per year growth rate. Combined with the lower rate of 1.7% for through truck trips,

[2] Washington State Department of Transportation, *Annual Traffic Reports*, 2001 through 2006.

it is only slightly higher than the projected overall growth rate in regional trucks of 2.3%. The fact that it is higher is reasonable since there will be some truck trips generated by other freight modes (for example, air cargo trips that are trucked to the airport, or pipeline freight that is trucked to the end customer). However, the growth will not occur uniformly throughout the County. Industrial growth will be concentrated into a few areas. Table 4 presents the employment growth rate by truck travel shed and shows the existing and forecast employment within the five industrial and manufacturing sectors used in the regional transportation model. Forecasts for each of the 37 Truck Travel Analysis Zones (TTAZs) are provided in Attachment A.

Table 4. Clark County Employment, 2005 to 2030 and Truck Trip Growth Rates

		Employment		
Truck Travel Sheds and Description [1]		2005	2030	Truck Trip Growth Rate[3]
1	Downtown Vancouver, west of I-5	6,320	22,667	5.2%
2	East of I-5 between I-5, I-205 and the Columbia River	12,271	15,379	0.9%
3	East of I-205, west of Camas	7,158	12,203	2.2%
4	Camas/Washougal	5,053	13,810	4.1%
5	North of Camas/Washougal	1,173	1,536	1.1%
6	North and east of I-205 and I-5, west of Battle Ground	5,123	14,703	4.3%
7	Ridgefield	1,050	7,020	7.9%
8	La Center and rural area east of I-5	638	1,203	2.6%
9	Battle Ground	1,645	1,994	0.8%
10	North of Battle Ground	854	1,205	1.4%
	TOTAL	41,285	91,719	3.2%

*1) Refer **to Figure 4**. Travel sheds based on TAZs.*

2) Source: 2005, ES-202 data. 2030, Clark County/RTC/Metro. Five employment types include: agriculture/ forestry/mining, construction, manufacturing, transport/ communication/ public utilities, and wholesale trade.

3) Medium and Heavy Trucks, FHWA Classifications 6 – 13.

1.4 Conclusion

The estimated truck trip growth rates can be used for planning and programming and provide a tool for evaluating truck volumes during project design. The truck trip growth rates can be easily modified in the future as conditions change and new employment forecasts are prepared. Some areas of the County may realize the increase in industrial employment if a large manufacturing center were to develop. However, until the economy recovers, this could reduce potential growth in other areas of the County.

Finally, the truck trip growth rates should be applied carefully during project pre-design. Software used in operational analysis typically includes a default value of 2% trucks. For arterials and

highways serving industrial areas the proportion of trucks may be much higher. The proportion of medium and heavy trucks can affect intersection capacity analysis and roadway capacity analysis, particularly roadways with uphill or grades. If the project supports future industrial development the proportion of trucks in the forecast traffic volumes should be adjusted to reflect the expected growth in truck traffic.

2. References:

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Cambridge Systematics, *Statewide Rail Capacity and System Needs Study,* Final Report, December 2006.

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