

Washington State Freight Truck Origin and Destination Study: Douglas County



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by

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in cooperation with

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EWITS Research Report: Background and Purpose

This is the twenty-first in a series of Research Reports prepared from the Eastern Washington Intermodal Transportation Study (EWITS). The reports prepared as a part of this study provide information to help shape the multimodal network necessary for the efficient movement of both freight and people into the next century.

EWITS is a six-year study funded jointly by the Federal government and the Washington State Department of Transportation as a part of the Intermodal Surface Transportation Efficiency Act of 1991. Dr. Ken Casavant of Washington State University is Director of the study. A state-level Steering Committee provides overall direction pertaining to the design and implementation of the project. The Steering Committee includes Jerry Lenzi, Chair and Regional Administrator (WSDOT, Eastern Region); Richard Larson, Regional Administrator (WSDOT, South Central Region); Don Senn, Regional Administrator (WSDOT, North Central Region); Charles Howard (WSDOT, Planning Manager), and Eric Berger, Executive Director, County Road Administration Board. Pat Patterson represents the Washington State Transportation Commission on the Steering Committee. An Advisory Committee with representation from a broad range of transportation interest groups also provides guidance to the study. The following are key goals and objectives for the Eastern Washington Intermodal Transportation Study:

- *Facilitate existing regional and state-wide transportation planning efforts.*
- *Forecast future freight and passenger transportation service needs for eastern Washington.*
- *Identify gaps in eastern Washington's current transportation infrastructure.*
- *Pinpoint transportation system improvement options critical to economic competitiveness and mobility within eastern Washington.*

For additional information about the Eastern Washington Intermodal Transportation Study or this report, please contact Ken Casavant at the following address:

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EWITS PREVIOUS REPORTS NOW AVAILABLE

1. Gillis, William R. and Kenneth L. Casavant. "Linking Transportation System Improvements to New Business Development in Eastern Washington." EWITS Research Report Number 1. February 1994.
2. Gillis, William R. and Kenneth L. Casavant. "Lessons from Eastern Washington: State Route Mainstreets, Bypass Routes and Economic Development in Small Towns." EWITS Research Report Number 2. February 1994.
3. Gillis, William-R. and Kenneth L. Casavant. "Washington State Freight Truck Origin and Destination Study: Methods, Procedures, and Data Dictionary." EWITS Research Report Number 3. December 1994.
4. Gillis, William R. and Kenneth L. Casavant. "Major Generators of Traffic on U.S. 395 North of Spokane: Including Freight Trucks and Passenger Vehicles Crossing the International Border." EWITS Research Report Number 4. January 1995.
5. Newkirk, Jonathan, Ken Eriksen, and Kenneth L. Casavant. "Transportation Characteristics of Wheat and Barley Shipments on Haul Roads To and From Elevators in Eastern Washington." EWITS Research Report Number 5. March 1995.
6. Jessup, Eric and Kenneth L. Casavant. "A Quantitative Estimate of Eastern Washington Annual Haul Road Needs for Wheat and Barley Movement." EWITS Research Report Number 6. March 1995.
7. Gillis, William R., Emily Gruss Gillis, and Kenneth L. Casavant. "Transportation Needs of Eastern Washington Fruit, Vegetable and Hay Industries." EWITS Research Report Number 7. March 1995.
8. Casavant, Kenneth L. and William R. Gillis. "Importance of U.S. 395 Corridor For Local and Regional Commerce in South Central Washington." EWITS Research Report Number 8. April 1995.
9. Gillis, William R., Eric L. Jessup, and Kenneth L. Casavant. "Movement of Freight on Washington's Highways: A Statewide Origin and Destination Study." EWITS Report Number 9, November 1995.
10. Chase, Robert A. and Kenneth L. Casavant. "Eastern Washington Transport-Oriented Input Output Study: Technical Report." EWITS Research Report Number 10. March 1996.

11. Chase, Robert A. Kenneth L. Casavant. "The Economic Contribution of Transport Industries to Eastern Washington." EWITS Report Number 11. April 1996.
12. Lee, Nancy S. and Kenneth L. Casavant. "Waterborne Commerce on the Columbia-Snake." EWITS Report Number 12. October 1996.
13. Alderson, Lynn C., Kenneth L. Casavant and Eric Jessup. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Washington Highways: Part I Economic Structure of the Industry." EWITS Research Report Number 13. January 1997.
14. Eriksen, Ken and Kenneth L. Casavant. "Impact of North American Free Trade Agreement (NAFTA) on Washington Highways - Part 1: Commodity and Corridor Projections." EWITS Research Report Number 14. January 1997.
15. Alderson, Lynn C. and Kenneth L. Casavant. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Washington Highways: Part 2 Movement of Raw Logs." EWITS Research Report Number 15. May 1997.
16. Alderson, Lynn C. and Kenneth L. Casavant. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Washington Highways: Part 3 Shipment from Mills." EWITS Research Report Number 16. May 1997.
17. Alderson, Lynn C. and Kenneth L. Casavant. "Transportation Characteristics and Needs of Forest Products Industries Using Eastern Washington Highways: Part 4 Commercial Shipments." EWITS Research Report Number 17. February 1997.
18. Jessup, Eric L., John Ellis, and Kenneth L. Casavant. "A GIS Commodity Flow Model for Transportation Policy Analysis: A Case Study of the Impacts of a Snake River Drawdown." EWITS Research Report Number 18. May 1997.
19. Lee, Nancy S. and Kenneth L. Casavant. "A Commodity and Origin-Destination Analysis of Rail Traffic in Washington--1990-1995. EWITS Research Report Number 19. May 1997.
20. Edwards, Richard, Eric L. Jessup, and Kenneth L. Casavant. "Eastern Washington On-Farm and Commercial Grain Storage." EWITS Research Report Number 20. January 1998.

EWITS Previous Working Paper Series Now Available

1. Lee, Nancy and Ken Casavant. "Grain Receipts at Columbia River Grain Terminals." EWITS Working Paper #1, March 1996.
2. Lenzi, Jerry, Eric Jessup, and Ken Casavant. "Prospective Estimates for Road Impacts in Eastern Washington from a Drawdown of the Lower Snake River." EWITS Working Paper #2, March 1996.
3. Ellis, John, Eric Jessup, and Ken Casavant. "Modeling Changes in Grain Transportation Flows in Response to Proposed Snake River Drawdowns: A Case Study for Eastern Washington." EWITS Working Paper #3, March 1996.
4. Painter, Kate and Ken Casavant. "A Comparison of Canadian Versus All Truck Movements In Washington State With A Special Emphasis On Grain Truck Movements." EWITS Working Paper #4, March 1996.
5. Jessup, Eric L., John Ellis and Kenneth L. Casavant. "Estimating the Value of Rail Car Accessibility for Grain Shipments: A GIS Approach." EWITS Working Paper #5. April 1996.
6. Painter, Kathleen M. and Kenneth L. Casavant. "Truck Movement Characteristics on Selected Truck Routes in Washington State." EWITS Working Paper #6. August 1996.
7. Lee, Nancy S. and Kenneth L. Casavant. "Grain Receipts at Columbia River Grain Terminals, 1980-81 to 1995-96." EWITS Working Paper #7. January 1997.
8. Jessup, Eric L. and Ken Casavant. "Economic Evaluation of Grain Shipment Alternatives: A Case Study of the Coulee City and Palouse River Railroad." EWITS Working Paper #8, March 1997.

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Introduction

A large statewide survey of truck traffic origination, destination, and freight characteristics provided the data for in-depth county level reports of freight truck movement in Washington State. Considerable detail on road usage, truck weight, truck configuration, commodity type, and seasonal traffic variation is available in this survey. We were able to examine a rich set of characteristics for trucks whose freight was either destined for or originating from a particular county. It is important to note the survey does not capture truck movement that did not pass through one of 20 survey sites located on major routes throughout the state (see Table 1A for survey sites). For this reason, considerable intra- and intercounty traffic will not be included for some counties depending on their proximity to a survey site. Again, these truck characteristics reflect only the truck movements as reported at the statewide survey locations.

Table 1A--Survey Sites and Traffic Direction

Weigh Station	Site Number	Direction of Traffic	Road Designation
Brady West, WA	1	West	SR12
Brady East, WA	2	East	SR12
Cle Elum East, WA	3	East	I90
Cle Elum West, WA	4	West	I90
Deer Park South, WA	6	South	SR395
Douglas POE (BC Border	7	North	I5
Everett North, WA	8	North	I5
Everett South, WA	9	South	I5
Goldendale, WA	10	North/South	SR97
Kelso South, WA	11	South	I5
Othello, WA	12	All Four	SR17
Pasco, WA	13	South	SR395
Peshastin West, WA	15	West	SR2
Plymouth POE, WA	16	North	SR395
East Port Angeles Westbound, WA	17	West	SR101
Sea Tac South, WA	19	South	I5
Sea Tac North, WA	20	North	I5
East Spokane POE, WA	21	West	I90
Tokio East, WA	22	East	I90
Tokio West, WA	23	West	I90
Umatilla POE, WA	24	South	SR395
Vancouver North, WA	25	North	I5
Wallula POE, WA	26	All Four	SR12, SR395, & SR 370
Osoyoos, BC (BC Border	28	North	SR97
Oroville, WA (US Border	29	South	SR97

Information for this report was provided by an extensive study of freight truck movements on major Washington State highways conducted under the Eastern Washington Intermodal Transportation Study (EWITS). This study was the first in the United States to collect statewide freight truck origination and destination data through direct interviews of truck drivers at weigh stations. Over 300 persons conducted these personal interviews of a total of 30,000 truck drivers, providing an extensive database on freight and goods movements in Washington State.

Method of Analysis

Truck traffic characteristics at the county level were analyzed for trucks whose trips either originated or ended in a particular county. Given the survey data, there was no feasible method for analyzing truck traffic that was simply passing through the county. Detailed truck traffic characteristics for each of Washington's 39 counties by season included number of trucks with freight destined for that county per day, their payload weight and commodity type; road usage, including number of trucks per day, freight weight and commodity type; and number of trucks per day, freight weight and commodity type by city of cargo origin and destination. Truck traffic was analyzed on an annual basis for the following characteristics: county road usage, average and total truck tonnage, and number of trucks by commodity; distribution of freight weight by commodity and by road; type of commodity hauled by truck configuration; and truck carriers' home base for truck trips originating or ending in that county. Truck traffic data is likely to be more accurate in terms of relative differences by road, season, etc., than actual magnitude for any one characteristic due to the nature of the survey approach.

Presentation of Results

Detailed truck traffic characteristics are presented for Washington's 39 counties in a set of nine tables for each county. Table 1 presents information by road for truck traffic either originating or ending in that county for each season. Characteristics include total number of trucks, number of trucks with freight, average payload, and total tonnage. In addition, the percentage of loads by commodity on each road is calculated.

Tables 2 and 3 present seasonal truck traffic characteristics by city of cargo origin and city of cargo destination, respectively. For each city, the daily number of trucks, trucks with freight, their average payload weight, and total truck traffic weight are presented. Again, there is a breakdown by commodity type for each city.

Table 4 summarizes truck traffic characteristics for trucks whose trips end in that county by season. Total daily truck traffic, number of trucks with freight, average payload weight, and the total tonnage per day as well as the percentage of truckloads by commodity are presented.

Table 5 analyzes truck traffic originating or ending in that county by commodity. The number of trucks per day as well as the average and total payload by commodity is presented. In addition, truck traffic usage by road is detailed for each commodity.

Table 6 shows distribution of payload weight by commodity for truck traffic originating or ending in that county. Five weight categories in five-ton increments are used. Table 7 presents distribution of payload weight by road for truck traffic originating or ending in that county. Weight characteristics by commodity and by road are easily identified from these two tables.

Table 8 shows truck configuration by commodity for truck traffic originating or ending in that county. The percentage of trucks with freight by configuration is presented for each commodity. Table 9 presents truckers' home base by city and the number of Washington-based carriers for truck traffic originating or ending in the county.

Overall, this county-by-county disaggregation of truck movements shows the powerful impact of particular commodity movements on certain roads and during certain seasons. Farm commodities are hauled from the field to the processor or market on a seasonal basis. Lumber harvest has considerable seasonal variation as well. Construction or closures on major roads used for these purposes will need to be planned accordingly. As different industries grow or shrink, they create specific demands on the transportation infrastructure that may need to be accommodated in future transportation planning.

These results represent a summary of truck traffic origin and destination information at the county level. This information should be useful for state and county planning with respect to traffic sources, either origin or destination, and the characteristics of this traffic. It should also be valuable for planning road maintenance and construction at the county and regional level.

Douglas County Results

The main truck routes in Douglas County are State Routes 97, 2, and 17 (SR97, SR2, and SR17) (Table 1). Truck traffic on SR97 ranges from 21 trucks per day in spring to nine per day in winter. Freight is varied, including agricultural products, petroleum, metal, and machinery. Traffic on SR2 ranges from ten trucks per day in summer to seven trucks per day in fall. Freight on this route consists of agricultural products, petroleum, metal, rock or sand, food, recycled materials, and machinery. Truck traffic as recorded in the survey for SR17 ranges from 18 trucks per day in spring to none in the fall. Agricultural products and glass or cement products are the main freight on this route.

Table 2 describes truck traffic originating from towns in Douglas County. The highest number of trucks per day originating from Douglas County are from Orondo in fall (8 per day), from Mansfield in winter (13 per day), from Rock Island in spring (15 per day), and from Rock Island in summer (6 per day). Freight originating from Orondo consists of either agricultural or food products. From Mansfield, food and machinery are the main freight categories. Metal, agricultural products, and rock or sand are the main products shipped from Rock Island. Payload weights averaging 30 tons or more occur for Rock Island and Waterville in winter and Rock Island in summer.

Trucks with freight destined for Douglas County are few in number, ranging from 12 per day in spring to one per day in summer, according to the survey results (Table 3). Trucks headed for Rock Island numbered four per day in fall and six per day in spring, and carried either transportation equipment or glass or cement products. Trucks headed for East Wenatchee numbered six per day in winter and six per day in spring, and carried petroleum and lumber or wood products. Just one truck was recorded in the survey for summer. This truck was headed for Mansfield and was empty. The heaviest average payload weight of 33 tons was recorded for trucks headed for Rock Island in spring, all carrying glass or cement products.

Total truck traffic heading for or leaving from Douglas County ranges from 50 trucks per day in spring to 15 trucks per day in summer (Table 4). Common freight types include agricultural products, food products, glass or cement products, petroleum, and machinery. Average payload weights ranged from 19 to 21 tons across the seasons.

Table 5 shows road usage by type of freight for the major commodities hauled into or out of Douglas County over the entire year. Over half of the trucks carrying agricultural products use SR97, while 24% use SR17, and 19% use SR2. Most food products are carried on SR2. Approximately one-half of all glass or cement products are carried on SR2 and one-half on SR17. SR2 is the predominant route for all other freight, with 81% of trucks using that route at some point in their journey. Approximately half of trucks carrying all other freight travel on SR97 (trucks may use both routes as well).

Weight category by commodity for trucks hauling freight into or out of Douglas County is presented in Table 6. For trucks carrying agricultural products, one-fourth fall in the

over 30 tons category, 35% are in the 20- to 25-ton weight category, and another one-fourth are in the 10- to 15-ton weight category. The majority of trucks carrying petroleum products fall into the 25- to 30-ton weight category. Approximately half of all trucks carrying glass or cement products weigh between 10 and 15 tons, while the remaining half weighs over 30 tons.

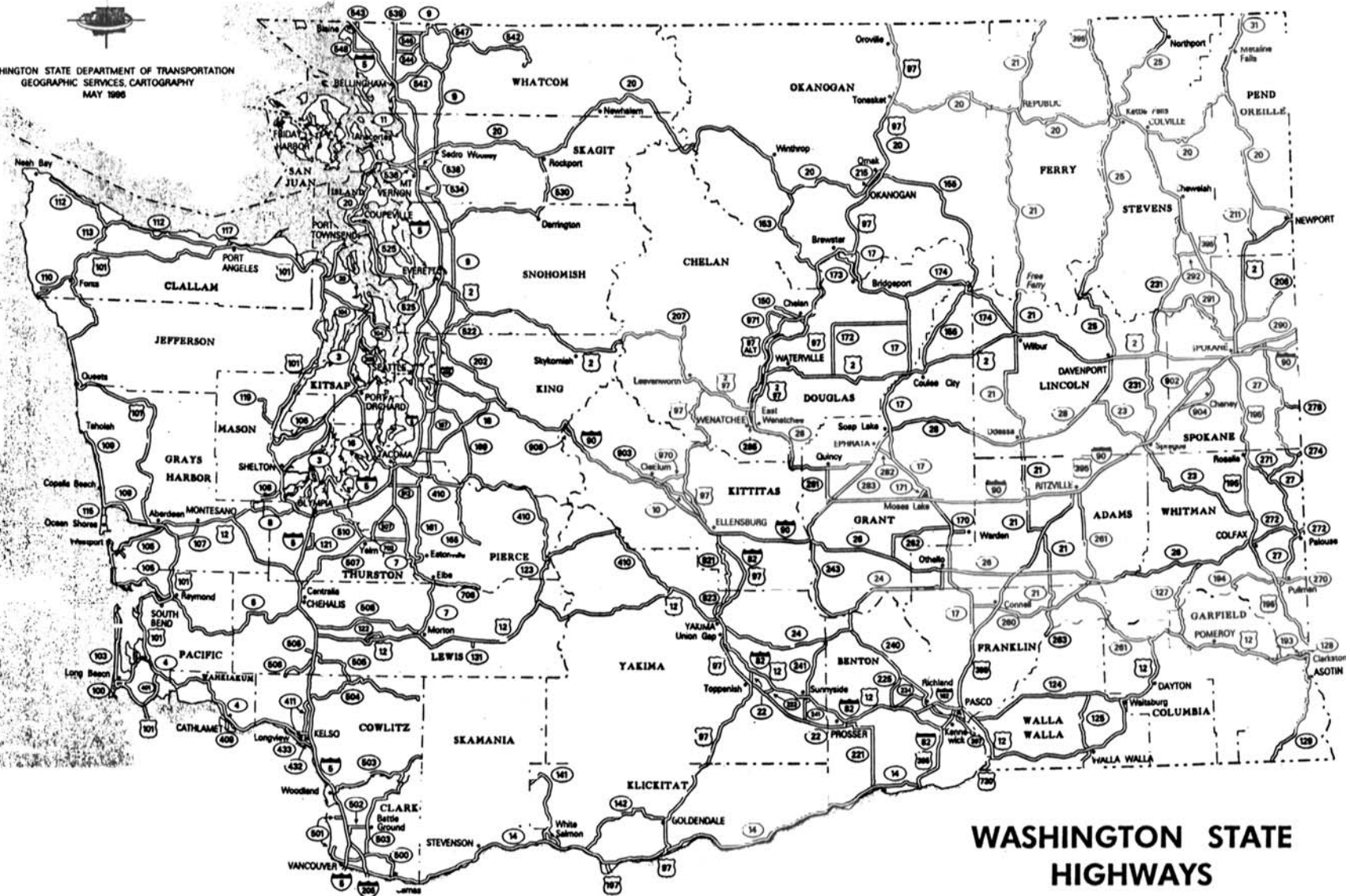
Table 7 shows weight category by roadway for truckloads originating or ending in Douglas County. Of the loaded trucks on SR97, 10% have payload weights of over 30 tons, while another 49% have payloads weighing between 20 and 30 tons. On SR2 and SR17, 28% and 46% of loaded trucks have payload weights of over 30 tons, respectively. On SR2, another 22% have payloads weighing less than five tons.

Fifty-nine percent of trucks carrying loads into or out of Douglas County are tractor-trailer configurations (Table 8). Another 14% are tractors plus two trailers. Thirteen percent of freight is hauled by truck and trailer configurations, with the remaining 7% hauled by straight trucks. The major freight categories, agricultural products and food, are hauled primarily by tractor and trailer configurations. All of the transportation equipment is carried by tractors.

Over the four-day survey period (one day in each season), a total of 125 trucks, loaded and empty, were either heading for or leaving Douglas County (Table 9). Of these trucks, 47% were Washington-based carriers. Portland, Oregon, Rancho Cucamonga in California, Seattle, and Rock Island were each home base for 8% of the trucks in the survey.



WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
GEOGRAPHIC SERVICES, CARTOGRAPHY
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WASHINGTON STATE HIGHWAYS

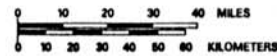


Table 1--Daily Truck Traffic by Road for Each Season, Douglas County

Season/ Road	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage ¹	Commodity	
					Category	Percent
Fall:						
SR97	10	5	20	96	Agricultural	100
SR2	7	1	22	24	Agricultural	100
Winter:						
SR17	7	0	0	0	Empty	100
SR97	9	6	19	110	Metal	17
					Agricultural	18
					Food	18
					Petroleum	45
SR2	9	6	23	129	Metal	18
					Agricultural	19
					Rock, sand	19
					Petroleum	23
Spring:						
SR17	18	12	23	273	Agricultural	50
SR97	21	15	24	350	Glass, cement	50
					Agricultural	41
					Rock, sand	8
					Lumber, wood	7
					Petroleum	35
SR2	9	7	14	102	Metal	8
					Agricultural	17
					Rock, sand	33
					Food	17
					Machinery	17
					Recycled materials	17

Table 1--Daily Truck Traffic by Road for Each Season, Douglas County (cont.)

Season/ Road	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage ¹	Commodity	
					Category	Percent
Summer:						
SR17	4	0	0	0	Empty	100
SR97	14	4	19	83	Agricultural	33
					Metal	33
					Machinery	33
SR2	10	4	20	88	Agricultural	33
					Petroleum	33
					Machinery	33

¹Total tonnage may differ from the number of trucks per day multiplied by the average payload due to rounding of values for average number of loaded trucks per day and average payload.

Table 2--Daily Truck Traffic by City of Cargo Origin for Each Season, Douglas County

Season/ Town	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage ¹	Commodity	
					Category	Percent
Fall:						
East Wenatchee	6	2	21	49	Agricultural	100
Mansfield	5	5	9	49	Machinery	100
Orondo	8	8	20	153	Agricultural	100
Winter:						
Mansfield	13	10	21	214	Food	100
Orondo	1	1	4	4	Food	100
Palisades	1	1	14	15	Rock, sand	100
Rock Island	8	2	32	68	Metal	100
Waterville	1	1	35	37	Agricultural	100
Spring:						
East Wenatchee	8	4	7	26	Food	33
					Machinery	33
					Recycled material	33
Orondo	8	7	15	112	Agricultural	100
Rock Island	15	9	27	243	Agricultural	59
					Rock, sand	27
					Metal	14
Waterville	6	6	12	66	Glass, cement	100
Summer:						
East Wenatchee	3	3	15	45	Agricultural	50
					Machinery	50
Waterville	3	1	25	37	Petroleum	100
Rock Island	6	1	30	44	Metal	100

¹Total tonnage may differ from the number of trucks per day multiplied by the average payload due to rounding of values for average number of loaded trucks per day and average payload.

Table 3--Daily Truck Traffic by City of Cargo Destination for Each Season, Douglas County

Season/ Town	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage ¹	Commodity	
					Category	Percent
Fall:						
Rock Island	4	4	25	99	Trans. equip	100
Winter:						
East Wenatchee	6	1	23	30	Petroleum	100
Waterville	1	1	4	4	Petroleum	100
Spring:						
East Wenatchee	6	6	24	150	Lumber, wood	16
					Petroleum	84
Rock Island	6	6	33	200	Glass, cement	100
Summer:						
Mansfield	1	0	0	0	Empty	100

¹Total tonnage may differ from the number of trucks per day multiplied by the average payload due to rounding of values for average number of loaded trucks per day and average payload.

Table 4--Truck Traffic for Trips Originating or Ending in Douglas County by Season

Season	Total Trucks Per Day (No.)	Loaded Trucks Per Day (No.)	Average Payload (Tons)	Total Tonnage ¹	Commodity	
					Category	Percent
Fall:	28	20	19	373	Agricultural	52
					Machinery	28
					Trans. equip	20
Winter:	31	18	21	376	Agricultural	6
					Rock, sand	6
					Food	63
					Petroleum	14
					Metal	12
Spring:	50	38	20	756	Agricultural	33
					Rock, sand	6
					Petroleum	14
					Glass, cement	31
Summer:	15	6	21	124	Agricultural	25
					Petroleum	25
					Metal	25
					Machinery	25

¹Total tonnage may differ from the number of trucks per day multiplied by the average payload due to rounding of values for average number of loaded trucks per day and average payload.

Table 5--Truck Trips by Commodity for Truck Traffic Originating or Ending in Douglas County

Commodity	Truck Trips	Total Weight		Avg. Payload (Tons)	County Roads Used	
	Per Year (%)	Tons	% of Total		Road	% of Trips
Agricultural	20	561	35	22	SR2	19
					SR97	53
					SR17	24
Food	10	109	7	9	SR2	92
					SR97	8
Glass, cement	9	260	16	22	SR2	52
					SR17	52
Other	61	663	42	21	SR2	81
					SR97	48

Table 6--Weight Category by Commodity for Truck Loads Originating or Ending in Douglas County

Weight Category (tons)	Commodity									
	Agriculture		Food		Petroleum		Glass, Cement		Other	
	No. of Loads	% of Total	No. of Loads	% of Total	No. of Loads	% of Total	No. of Loads	% of Total	No. of Loads	% of Total
<5	1	0	2	17	1	12	0	0	1	4
5 - <10	1	0	0	0	0	0	0	0	6	26
10 - <15	6	26	0	0	0	0	6	50	2	9
15 - <20	3	13	0	0	0	0	0	0	1	4
20 - <25	8	35	10	83	1	13	0	0	3	13
25 - <30	0	0	0	0	5	62	0	0	7	30
>30	6	26	0	0	1	13	6	50	3	13
Total	25	100	12	100	8	100	12	100	23	100

Table 7--Weight Category by Road for Truck Loads Originating or Ending in Douglas County

Weight Category (tons)	SR97		Road SR2		SR17	
	No.	%	No.	%	No.	%
<5	2	7	4	22	0	0
5 - <10	1	3	1	6	0	0
10 - <15	6	21	2	11	6	46
15 - <20	3	10	1	6	0	0
20 - <25	6	21	4	22	1	8
25 - <30	8	28	1	6	0	0
>=30	3	10	5	28	6	46
Total	29	100	18	100	13	100

Table 8--Type of Commodity Hauled by Truck Configuration, Douglas County

Commodity	Truck Configuration						No. of Loads
	1	2	3	4	5	6	
Agricultural products	10	10	0	43	4	0	25
Rock & sand	30	0	0	0	35	35	4
Food	10	0	0	90	0	0	13
Lumber & wood products	0	0	0	0	100	0	1
Petroleum products	0	30	0	57	14	0	9
Glass and cement products	0	0	0	48	52	0	12
Metal, metal products	0	78	0	0	22	0	5
Machinery	0	18	0	82	0	0	8
Transportation equipment	0	0	100	0	0	0	4
Recycled materials	100	0	0	0	0	0	1
Total	7%	13%	5%	59%	14%	1%	82

Legend: 1 = straight truck, 2 = truck and trailer, 3 = tractor only, 4 = tractor and trailer, 5 = tractor and two trailers, 6 = other

Table 9--Truckers' Home Base for Truck Trips Originating or Ending in Douglas County

Location	Number	Percent
By Town:		
Portland, OR	10	8
Rancho Cucuamonga, CA	10	8
Seattle	10	8
Rock Island	10	8
Other	85	69
Total	125	100
Wash. State carriers:	59	47